MAGELLAN

NAV 6500/NAV 6510 User Manual

Magellan NAV 6500/ NAV 6510 User Manual

WARNINGS

USE GOOD JUDGEMENT

This product is an excellent navigation aid, but does not replace the need for careful orienteering and good judgement. Never rely solely on one device for navigating.

USE CARE

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for its accuracy and maintenance.

The accuracy of position fixes can be affected by the periodic adjustments to GPS satellites made by the U.S. Government and is subject to change in accordance with the Department of Defense civil GPS user policy and the Federal Radionavigation Plan.

USE CAUTION

Accuracy can be affected by poor satellite geometry. When accuracy warnings appear on the screen, use the data with extreme caution.

USE PROPER ACCESSORIES

Use only Magellan cables and antennas; the use of non-Magellan cables and antennas may severely degrade performance or damage the receiver, and will void the warranty.

LICENSE AGREEMENT

*   *   *

Contents

Introduction

Congratulations on your purchase of the Magellan NAV 6500/ NAV 6510 receiver. The receiver integrates the remarkable accuracy of a GPS receiver with a broad range of electronic chart and navigation aids into a single easy-to-use navigation information center.

Equipped with C-MAP CF-95 cartography, the receiver can store up to 500 waypoints, and 25 routes with up to 50 legs. The large LCD display features a help bar on every screen and can be used either with cartography or as a track plotter to monitor progress.

The manual is to be used with either the NAV 6500 or the NAV 6510. These receivers differ in that the NAV 6510 is the color version of the NAV 6500.

This manual is divided into six chapters; *Introduction, Getting Started, Reference*, *Troubleshooting, Tutorial* and *Appendix.* It is very important that you go through the *Getting Started* chapter first as it prepares your receiver for use and provides basic instruction. The third chapter is a *Reference Section* for the features found in your receiver including step-by-step instructions on their use. Because of the advanced navigational features of the receiver some of the terminology used may be new to you. The *Troubleshooting* section gives you a problem and answer series to guide you with problems you may have. The fourth chapter is a *Tutorial* that walks you through the basic usage of the receiver. The final chapter, *Appendix*, contains some further explanations and information that will help you use your receiver and defines many of the terms that may be unfamiliar.

Packing List

The following items should be in your package:

> NAV 6500/NAV 6510 receiver
> Remote antenna with 40 ft coax cable
> Power/data cable
> Gimbal mount kit
> Plastic cover
> Flush mount kit
> Warranty card

If any of these items is missing, please contact your local Magellan dealer or distributor.

Conventions Used in this Manual

The reference section of this manual is designed to assist you in the use of your receiver. Each topic in the reference section includes a brief description of the activity chosen, a pictorial view of the keys to press, and a detailed description with sample screens of how to perform the activity. As you become more familiar with your receiver, you will be able to use the pictorial view of the keys as a "quick reference" to perform the desired activity.

Also in the reference section are alerts to inform you of some cautions or notes that will assist you in using your receiver.

The stop sign indicates information that is very important and should be read before continuing.

The light bulb denotes information that can help you use or understand your receiver. While this information is not required to perform the activity, it may provide you with a better understanding of the activity or shortcuts you can use.

Commonly Used Terms

A few of the terms used in this manual may be unfamiliar to you and are described in the *Glossary* found in the Appendix. To help you get started, some of the more common terms are described here with a simple explanation as to their meaning.

Position Fix: The receiver attains information from GPS satellites to compute a value (coordinates) that describes your unique position on the earth. This is called taking a **position fix** and the coordinates computed are referred to as the **position fix**.

Waypoint: (Abbreviated as WPT.) A position fix can be saved in memory with a name and type that you either assign or let the receiver assign for you. These saved position fixes are called **waypoints**.

MARK: You can mark the cursor position or your present position at any time by pressing the **MARK** key to create a waypoint.

GOTO: You can actually "Go To" a saved waypoint or any cursor position simply by pressing the **GOTO** key and choosing a destination waypoint. The receiver will navigate you from your present position to the waypoint chosen with bearing and distance information.

Route: A **route** is slightly different from a GOTO. A **route** contains a starting and ending waypoint and may include intermediate waypoints along the way. Routes can be from one waypoint to another (a single-leg route) or from a waypoint to a series of waypoints, (a multi-leg route) up to 50 legs.

Leg: Legs are the divisions of a route between waypoints. A route that goes from WPT A to WPT B, from WPT B to WPT C, and from WPT C to WPT D has three **legs.**

Getting Started

This section shows you how to begin using your receiver for the first time. After a brief description of the receiver, it discusses:

- Turning power on and off
- Adjusting contrast and backlighting
- First time use, initializing the receiver
- Navigating

Magellan NAV 6500/NAV 6510 Description

The Magellan GPS NAV 6500/NAV 6510 has a high contrast, high resolution backlit LCD, and backlit keypad and is designed to be either flush-mounted or gimbal mounted. Mount the unit as you plan on using it, install the antenna, and make all the electrical and data connections before you attempt to operate it. See the *Installation* section in the Appendix for details on mounting and connecting the receiver.

Keys

ZOOM IN - Changes the displayed map scale to view a smaller area in greater detail.

ZOOM OUT - Changes the displayed map scale to view a larger area in less detail.

CURSOR KEY - Controls cursor movement, and is used to select menu items as well as scroll through the alphanumeric series for data entry. The UP/DOWN and RIGHT/LEFT indicators on the CURSOR KEY move the cursor or highlight in the cardinal directions, up, down, right and left. The dots on the cursor key move the cursor diagonally on the map display.

ENTER - Used to confirm data entry and confirm selections on the screen.

CTR - Centers the boat or cursor on the screen and allows toggling between the boat and the cursor position.

GOTO - Creates a one-leg route directly to the selected waypoint or to the cursor position.

MARK - Records the present boat position or cursor position (if the map is displayed), as a stored waypoint.

ESC - Cancels and backs out of an operation or backs up one step in a sequence.

Magellan NAV 6500/NAV 6510 GPS Receiver

Display

ZOOM IN

ZOOM OUT

Cursor Key

ENTER Key

CTR (Center) Key

GOTO Key

MARK Key

PWR (Power) and Light Key

ESC (Escape) Key

Softkeys

Cartridge Slot (not shown)

TO BUOY
BRG 350° M
DTG 1.0 n
COG 359° M
SOG 5.5 kt
XTE R 0.3 n
TRN L 9°
VMG 5.4 kt
TTG 00:11

3D Navigation
Scale 4.0 n

Press ENT to view map info/set ref pt

Aux | Waypts | Routes | Hide | Nxt Scrn

Florida Bay
BUOY
FISH1
MARK
001
HTSPOT
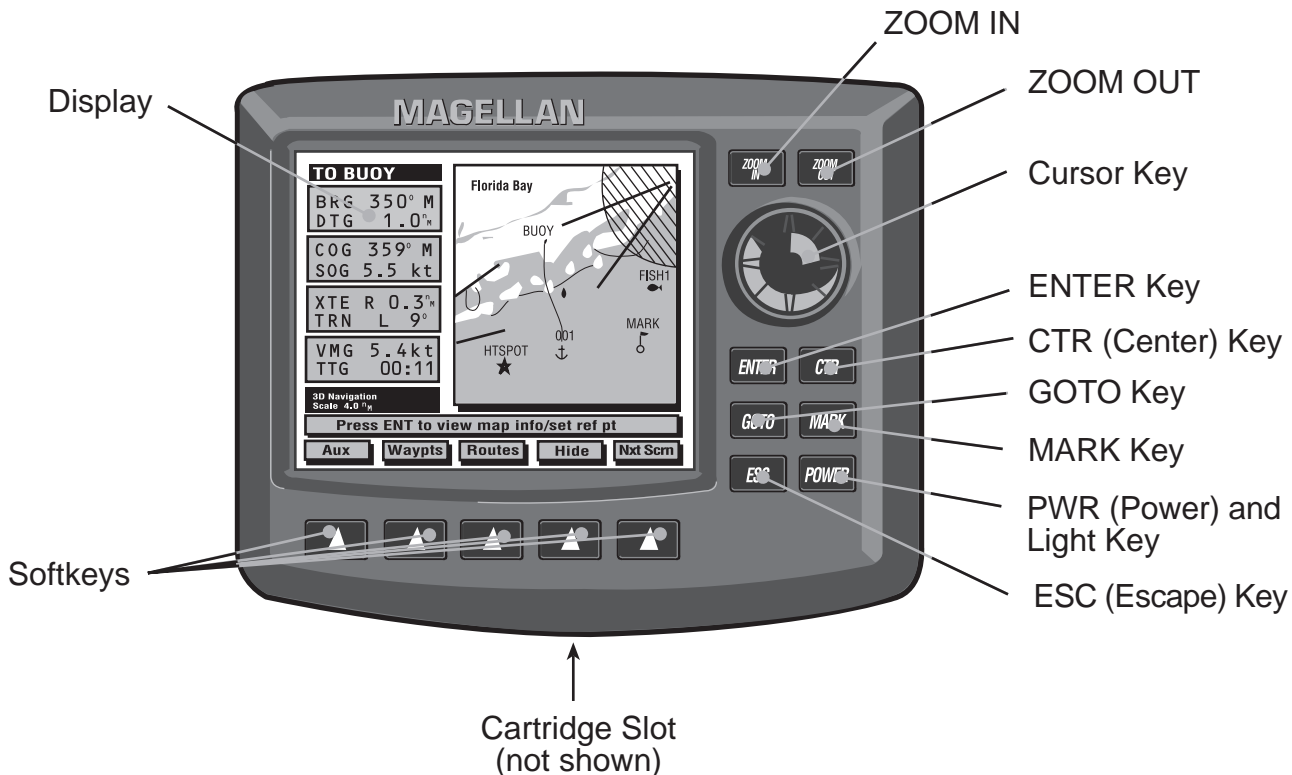
PWR - Turns the receiver on and off and adjusts the LCD and keys backlight intensity.

SOFTKEYS - Softkey functions are accessed using the keys along the bottom of the display. Softkey functions appear at the bottom of each screen.
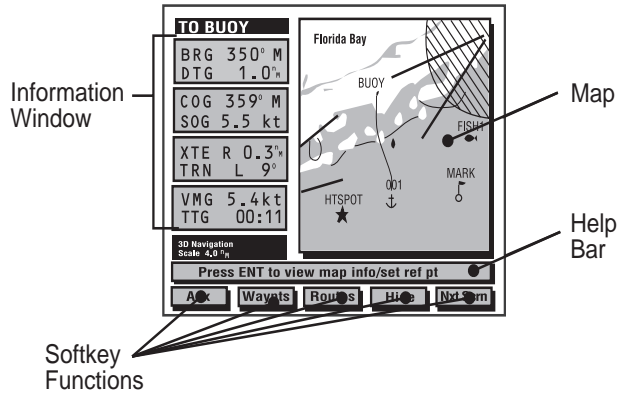
When the text of the softkey function is dark, the feature is accessible; when the text is grayed out, the function is available from this screen but is not currently accessible.

Using the Help Bar. The map screen and many of the function screens contain a help bar, located just above the softkeys, which tells you which action or actions you may perform on the current screen.

Power ON/OFF

To turn power on :

Press and release the **PWR** key.

The start-up screen and navigation warning screen are displayed.

From the warning screen, press any key to exit and continue.

To turn power off :

Press and hold down the **PWR** key.

A countdown window is displayed on the screen. The window will countdown from 3 to zero.

Continue to hold the **PWR** key until the countdown is complete. The unit turns off.

Adjusting Contrast

Press the **AUX** softkey to access the *AUXILIARY MENU* screen.

While "General Setup" is highlighted in the *Auxiliary* window, press **ENTER** to access the window at right, containing the CONTRAST option.

Use the **CURSOR KEY** to highlight CONTRAST and press **ENTER**. A bar graph appears.

Use the **RIGHT/LEFT** arrows on the **CURSOR KEY** to adjust the contrast to a comfortable level, then press **ENTER** to confirm.

Follow the instructions at the bottom of the screen, pressing **ESC** twice to back out of the AUXILIARY screen.

Adjusting Backlighting

Adjust backlighting to three different levels of intensity by pressing and releasing the **PWR** key repeatedly. The intensity increases and decreases incrementally when the PWR key is pressed.

First Time Use - Initializing the Receiver

The constellation of 24 GPS satellites circling the globe is in constant motion and before your receiver can tell you where you are, it needs to know where the satellites are relative to itself. Your receiver's internal almanac tells it which satellites are in view at a given geographic position.

Therefore, you need to enter your approximate location, time and date, which will serve as a point of reference for your receiver in selecting the best satellites to use. Without knowing its approximate location, the receiver may take 10 minutes or more to find the specific coordinates of your position.

Telling your receiver the initial position, time and date is called *initializing* your receiver; initializing enables it to begin tracking satellites, and therefore, calculating your position, much faster.

You need not reinitialize your receiver each time you use it, but only if the unit has moved over 300 miles without computing a postion or if the total memory has been cleared by the user. If you do not reinitialize, the receiver may take 10 minutes or more to compute a new position fix.

Entering an Approximate Initial Position. To give your receiver an approximation of its current position, you will need to enter the latitude and longitude of your general location. The receiver allows you to enter the location quickly and easily using the *MAP* screen.

While viewing the *Satellite Status* screen, press the **INIT POS** softkey. The Map screen will appear.

Use the **CURSOR KEY** to move the cursor to your present geographic area on this map. Use the **ZOOM IN /ZOOM OUT** keys to help you determine whether the cursor is active in the right part of the globe. (Some basic knowledge of continental land masses is helpful.)

If the cursor is not in your region of the world, press **ZOOM OUT** repeatedly, then use the **CURSOR KEY** to move the cursor to your present geographic area and use the **ZOOM IN** key repeatedly to zero in on your present location.

When you have placed the cursor near your current loca-

tion, press **ENTER**, as you are instructed to do by the help bar.

Now the help bar displays the word "Initializing..." and the receiver returns to the *Satellite Status* screen.

The receiver records the coordinates of the cursor position where ENTER was pressed as the starting point from which it searches for available satellites. When it begins receiving signals from satellites, this approximate coordinate position will be updated to reflect your actual position.

Pressing the ESC key before initializing returns to the *Satellite Status* screen without changing the initial position.

Setting the Date and Time. To set the UTC date and time, press the **AUX** soft key.

UTC, or Universal Time Coordinates, is simply the current local time at the Prime Meridian running through Greenwich, England. You must calculate the local offset and enter the correct time expressed in UTC for initializing your receiver. (Be reminded that as you calculate your UTC you need to correct for changes in your time zone due to daylight savings time.)

While "General Setup" is highlighted in the *Auxiliary* window, press **ENTER** to access the window at right, containing the options, UTC DATE and UTC TIME.

Use the **CURSOR KEY** to highlight UTC DATE and press **ENTER**.

Use the **CURSOR KEY** to change the date to the current UTC date, then press **ENTER** to confirm.

Use the **CURSOR KEY** to highlight UTC TIME and press **ENTER**.

Use the **CURSOR KEY** to change the time to the current UTC time, then press **ENTER** to confirm.

Press **ESC** twice to return to the previously viewed NAV screen.

In a few seconds, after being initialized, the receiver will acquire its first position fix, displaying the actual latitude and longitude coordinates of your current position.

It is necessary to have a current position fix in order for the receiver to compute navigation information. If you do not have a position fix, the navigation information will be displayed with dashes until a position fix is acquired.

The format of the coordinates displayed can be changed. Latitude and longitude (LAT/LON) are expressed in ddd mm.ss, ddd mm.mm or ddd mm.mmm. The first option uses seconds (there are 60 seconds to one minute of latitude or longitude), while the second and third options use decimal format. Other formats include: UTM, OSGB and TDs.

See Navigation Setup for instructions on changing the coordinate system.

Navigating with Your Receiver

Navigation requires setting waypoints and routes. You can either create waypoints first, using the Waypoints softkey function, and then create routes using those waypoints, or go directly to the Routes function and connect the waypoints into a route as you create them.

Once the route is created, it must be activated. As you get ready to navigate, make sure the boat icon representing your present position is active (press CTR and the boat appears at the center of your screen, press it again and the cursor is centered). Also, make sure that the unit is computing fixes, then it is ready to update navigation information.

As you navigate, you can look at the map screen to see graphically how you are progressing and where you are with respect to your planned route. You can view important navigation data in the information window to the left of the map. You can also use the Nav 1 screen to get complete information on your navigation such as position coordinates, DTG, BRG, SOG, COG, VMG, TRN, TTG and ETA to the next destination waypoint. If you wish to use other parameters for navigation, you may customize the Nav 2 screen.

If you are not planning to monitor the receiver continuously, you may choose to turn on certain alarms to warn you when you are drifting off course or approaching your destination waypoint.

The unit can also be connected to an autopilot. The steering of the boat is then done automatically by the autopilot using NMEA messages output by the unit.

Reference ³

General Usage

Turning the Receiver ON/OFF

To turn power on :

> **PWR** 💡

Press and release the **PWR** key.

The copyright and warning screens are displayed.

From the warning screen, press any key to exit and continue.

To turn power off :

> **PWR** 💡 Hold down until
> countdown is finished.

A countdown window is displayed on the screen. The window will countdown from 3 to zero: POWERING DOWN IN 3 Seconds.

Continue to hold the PWR key until the countdown is complete. The unit turns off.

Cancelling an Operation

> **ESC**

Use the **ESC** key to cancel and back out of an operation. (except in setup)

Inputting Data

Use the **CURSOR KEY** to select menu items as well as scrolling through alphanumeric series for data entry.

Use the **UP/DOWN** indicators on the CURSOR KEY to scroll up and down through the alphanumeric list, stopping on the selection. Then use the **RIGHT/LEFT** indicators on the CURSOR KEY to move the highlight to the right or left to continue or correct data entry.

Use **ENTER** to confirm data entry.

Adjusting Contrast

| AUX | Highlight
General Setup
Press ENTER | Highlight
Contrast
Press ENTER | ◄ ● ► Adjust
Contrast | **ENTER** |

Press the **AUX** softkey to access the *AUXILIARY MENU* screen.

While "General Setup" highlighted in the *Auxiliary* window, press **ENTER** to access the window at right, containing the CONTRAST option.

Use the **CURSOR KEY** to highlight CONTRAST and press **ENTER**.

A bar graph appears.

Use the **RIGHT/LEFT** arrows on the **CURSOR KEY** to adjust the contrast to a comfortable level, then press **ENTER** to confirm.

Follow the instructions at the bottom of the screen, pressing **ESC** twice to back out of the AUXILIARY screen and return to the last viewed root screen.

Adjusting Backlighting

Adjust backlighting to four different levels of intensity by pressing and releasing the **PWR** key repeatedly. The intensity increases and decreases incrementally when the PWR key is pressed.

NAV Screens

The receiver has four different NAV screens that provide you with information that you can use for navigating: *SAT STATUS, MAP, NAV 1* and *NAV 2*.

From any NAV screen, press the **Nxt Scrn** soft key repeatedly to cycle through the four NAV screens. *The SAT STATUS screen, MAP screen, NAV 1,* and *NAV 2* screens are constantly updating and contain the information necessary to guide you to your destination. You can customize the NAV 2 screen to display the navigation information you find most useful (see customizing).

Satellite Status Screen

The first screen after the navigation warning screen is the *Satellite Status* screen. This screen displays information relating to the satellites being tracked, searched for, or used in the position fix.

A bar graph shows the signal quality of the satellites being tracked. The satellite identification numbers are shown along the bottom of the graph, and the signal strength is shown along the left edge. The longer the bar, the stronger the signal of the corresponding satellite.

The satellites' positions in the sky are plotted at right in 2 concentric circles representing 0° elevation at the horizon, and 45°. The center point of the circle, 90°, is directly overhead. The satellites being tracked are shaded.
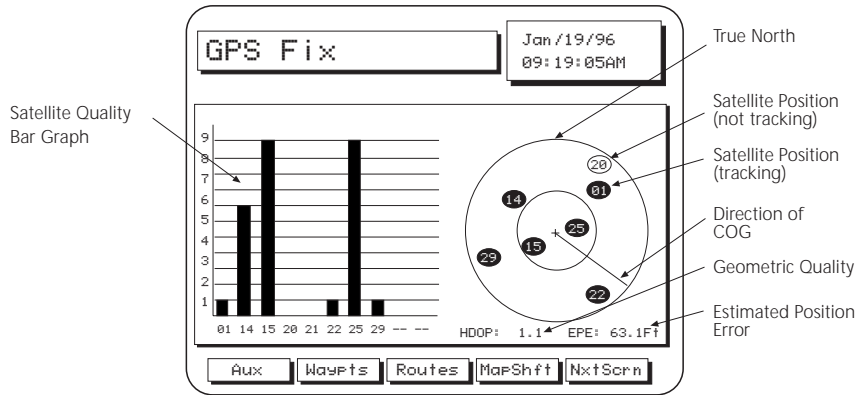
The current time, date, GPS status, geometric quality (HDOP) and estimated position error (EPE) are also displayed. When the unit is first turned on, or when the position fix is more than 20 seconds old, the GPS status field will indicate "Acquiring," the HDOP and EPE numbers are replaced by underscores and the available softkeys are Aux, Waypts, Routes, Init Pos, and Nxt Scrn.

Init Pos can be used to initialize the unit (see Entering an Approximate Initial Position).

If the receiver is computing fixes and moving faster than 0.2 mph, a line from the center to the outer circle points in the direction of COG. The direction of the line is updated whenever COG changes.

When the unit is computing fixes the GPS status field will indicate "GPS Fix" and the active softkeys at the bottom of the Satellite Status screen are Aux, Waypts, Routes, Map Shft and Nxt Scrn.

If the boat's position plotted on the map screen is consistently offset from the coordinates plotted on the paper chart, a bias may exist in the paper chart due to the datum used. You can use Map Shift to apply an offset to the boat's position to correct for the bias. See the section entitled Map Shift.

From the SAT STATUS screen, press **Nxt Scrn** to access the *Map* Screen.

When the *Map* Screen is viewed for the first time after the unit is turned on, the map always shows the cursor location before the unit was turned off.

💡 If the receiver is not yet initialized, the cursor position defaults to 00°00.00 N and 00°00.00 E, off the African coast in the Gulf of Guinea. See Initializing.

On the left side of the screen, an information window displays the name of the destination waypoint of the active route (if any), the distance and bearing from the present position to the destination waypoint, the cartographic scale, and GPS status, as well as COG, SOG, XTE and steering data if you are moving.

Ten seconds after accessing the *Map* screen, the help bar disappears and the date and time are shown.

```
   To Cursor
 ┌─────────────────┐
 │ BRG 035°     M  │
 │ DTG 6.7      n  │
 │              m  │
 ├─────────────────┤
 │ COG 359°     M  │
 │ SOG   7.0    k  │
 │              t  │
 ├─────────────────┤
 │ XTE    --.-   n │
 │ TRN    ---°   m │
 ├─────────────────┤
 │  34°06'34"N     │
 │ 119°26'01"W     │
 ├─────────────────┤
 │ GPS Fix         │
 │ Scale:   954n   │
 │              m  │
 └─────────────────┘
 ┌─────────────────┐
 │ 03:07:21 PM     │
 └─────────────────┘
 ┌────┐┌──────┐┌──────┐┌────┐┌───────┐
 │Aux ││Waypts││Routes││Hide││NxtScrn│
 └────┘└──────┘└──────┘└────┘└───────┘
```
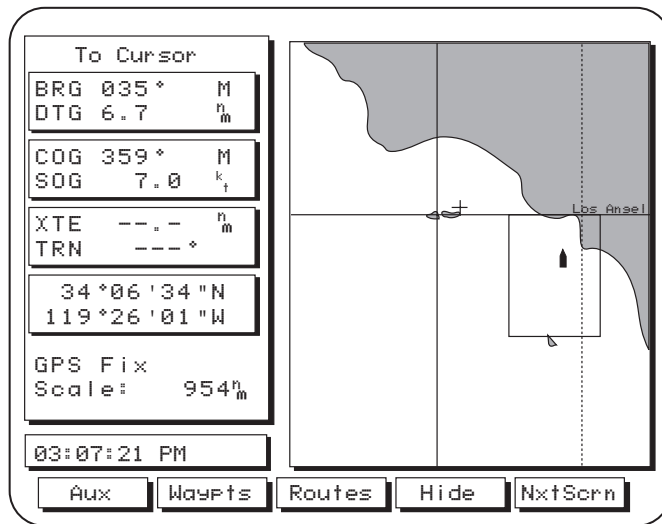
Press the **Hide** softkey to temporarily remove the information window, extending the map to the full screen width. Press the **Show** softkey to redisplay the information window.

While the information window is hidden, press **ESC** to remove and deactivate the softkey labels, enlarging the map to the dimensions of the entire display. Press **ESC** again or any softkey to bring the softkey labels back into view.
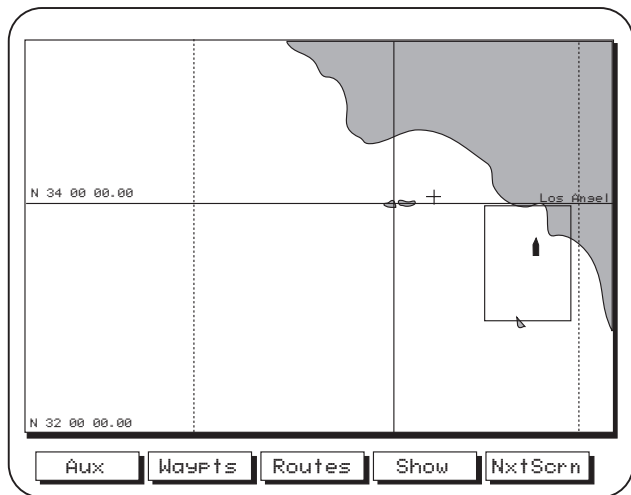
When the unit computes a fix, the present position will be represented by a boat icon. If the position is more than 20 seconds old it is represented by the (✹) icon.

If the last computed fix is differentially corrected, the letter D appears next to the GPS status.

Setting the Map Scale

The map screen first appears in the highest possible scale setting. Use the **ZOOM IN** and **ZOOM OUT** keys to zero in on a small area of the map or pan over a larger area.

The receiver retains the scale level last used when you go to view other screens or when the receiver is turned off. If the cartridge is changed, the screen will once again zoom to the highest scale.

Map scale can also be changed from the Waypoint and Route functions.

Using the Cursor Key on the Map Screen

Press the **CURSOR KEY** to activate and move the cursor on the *Map* screen.

The cursor is represented by a + .

The information window displays the bearing and distance from the present position (boat) to the cursor location (+), the coordinates of the cursor, COG and SOG.

VMG and TTG are replaced by the cursor coordinates and XTE and TRN are replaced by underscores.

While the cursor is active, press **CTR** to center the map around the present position boat icon. Press **CTR** again to recenter the display on the cursor.

If the boat and the cursor are shown on the screen, pressing CENTER first centers the map around the present position and removes the cursor icon, though it remains active. Pressing CENTER again centers the map around the cursor and the present position boat icon is continuously updated.

> If the map is centered on the boat, pressing the **CURSOR KEY** will activate the cursor. If the cursor was already active somewhere else on the map and is not shown on the screen, that cursor position is lost.

As you scroll across the map, the map will follow the cursor movement when the cursor comes near the edge. The map redraws with the cursor near the edge.

Map Orientation

The map orientation can be set to North Up or Track Up. When North Up is selected, the boat icon rotates according to the COG direction with respect to north. The map on the previous page is shown in North Up mode.

When Track Up is selected, the map turns to keep the boat icon pointing upwards. The top of the screen is then always the COG direction. The map rotates every time the COG changes more than the specified number of degrees set under Aux functions (see Selecting Map Orientation, Auxiliary Functions).
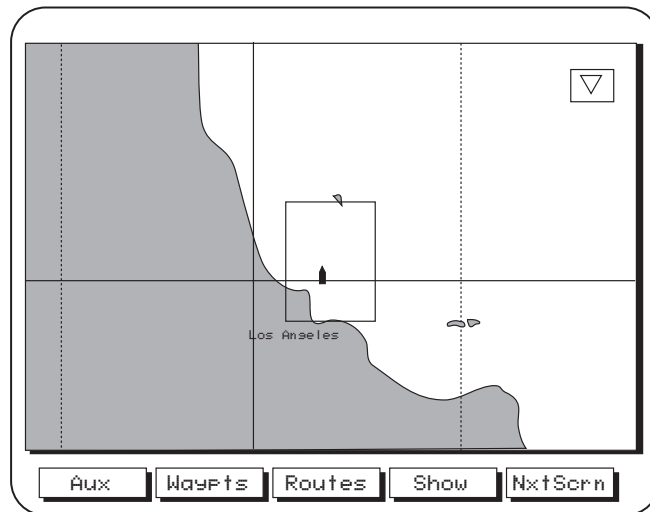
Track Plot Mode

Track Plot Mode allows you to go where no man has gone before - or at least where your chart does not provide detailed navigation information - by displaying a LAT/LON grid without background cartography.

⚠ Though you can use this feature to plot and retrace your course conveniently using coordinates alone, EXTREME CAUTION IS REQUIRED when using the Track Plot Mode. The Track Plot Mode should never be used as a sole means of navigation. Paper charts are required.

If a cartridge is not installed, zooming into a scale not supported by the built-in map activates the Track Plot mode. If a cartridge is installed, zooming into a scale not supported by either the cartridge or the internal map also activates the Track Plot mode.

In this mode, the LAT/LON grid and label are turned on automatically, even if they are off in the Map Configuration and a warning appears for two seconds to let you know you have zoomed to a scale not supported by cartography.

Track Plot Mode then plots the route you are traveling on a grid showing coordinates, without background cartography.

Viewing Nav-Aid Attributes

Map objects appear as icons on the map. The Nav-Aids (buoys, lights, signals, etc.) and other objects are part of the cartography such as rocks, wrecks, etc. See Appendix for a list of map objects.

Object attributes appear instantly on the map screen in a QUICK INFO window when the cursor covers an icon, giving a description of the object or objects. The abbreviated description is similar in format and content to what you would see in a standard paper chart.
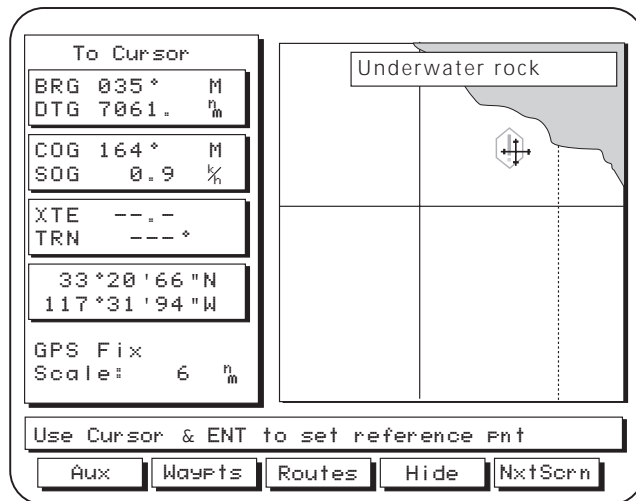
Press **ENTER** and the softkeys Expand, All Info, LocPort and Set Ref become active. To view additional information on the Objects shown in the QUICK INFO window, press **ENTER** and a full-screen window opens, showing a list of the objects under the cursor.
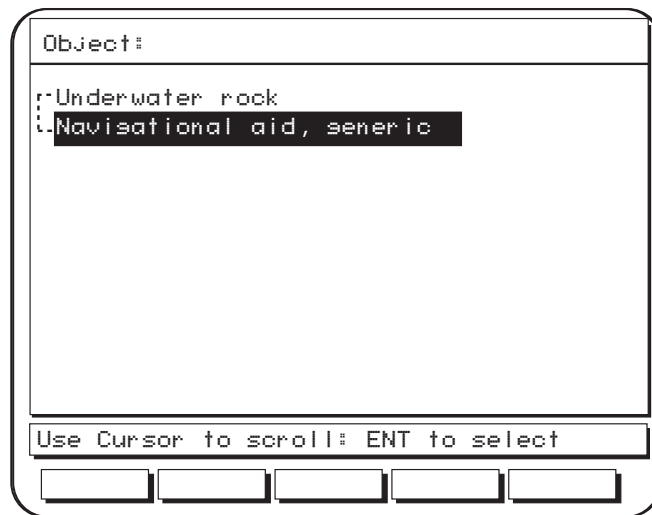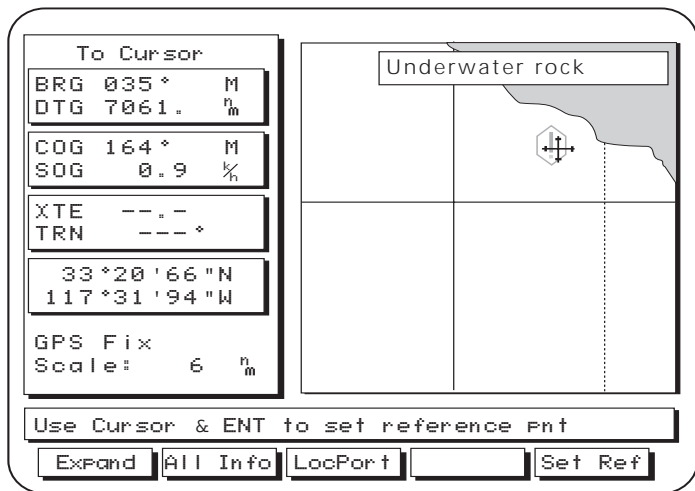
When the **ENTER** key is pressed, the objects now appear in the form of a menu. Use the **CURSOR KEY** to highlight an object on the menu and press **ENTER**. For example, to view the attributes for "Navigational aid, generic" use the **CURSOR KEY** to highlight it and press **ENTER**.

Complete attributes on the selected object appear.

```
┌─────────────────────────────────────────────┐
│  Navigational aid, generic:                   │
│                                               │
│  Generic navigational aid information         │
│   DANA POINT BREAKWATER LIGHT '5' FL G 4S R=9M HOR │
│   N US LL# 2395                               │
│                                               │
│                                               │
│                                               │
│                                               │
│                                               │
│                                               │
│                                               │
│           [     ][     ][     ][Restart][PageDn] │
└─────────────────────────────────────────────┘
```
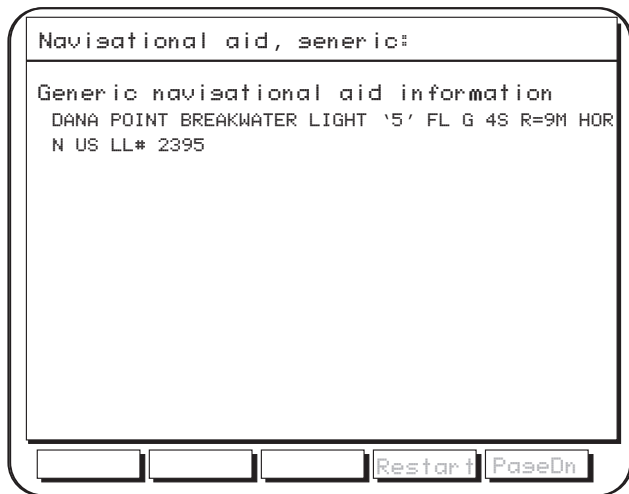
Sometimes a single object, such as a floating Navigation mark, may contain several navigational aids such as a buoy, a radar transponder beacon and a fog signal. In this case, when you press ENTER, the navigational aids appear on the menu and you may select them by highlighting them individually and pressing ENTER to view their attributes.

If there is a single object under the cursor on the map and it consists of one nav-aid, pressing Expand will immediately display the attributes of the object.

When you have finished viewing attributes, press **ESC** to return to the object menu, and **ESC** again to return to the map screen.

Finding Distance and Bearing from a Point on the Map

You can find the distance and bearing from one point to another on the *Map* screen using a built-in "measuring stick."

Move cursor to Ref. Point → **ENTER** → Set Ref → Move cursor to 2nd Point

Use the **CURSOR KEY** to place the cursor on the starting reference point from which you are measuring. Press **ENTER, Set Ref** to activate the reference point. A temporary reference point icon is created on the screen at the cursor position.

The information window heading displays "Ref Cursor."

Use the **CURSOR KEY** to move the arrow to a second point. The bearing, distance and other navigation data displayed in the information window change by increments as you move the cursor, drawing a dotted line between the two points.

Press **SET REF** again, and the the reference point changes to the new cursor location, which becomes the starting point of the measurement.

Pressing **SET REF** when the cursor is not active sets the last computed position fix or the boat's position as the reference point. Use the **CURSOR KEY** to move to a second point. Press **ESC** to exit the reference point feature.

You may want information about the changing tides at a certain Tide Reference Station. From the *Map* screen, while a C-MAP cartridge is installed, use the **ZOOM IN** and the **CURSOR KEY** to find a Tide Reference Station icon (⬦T⬦). Place the **CURSOR KEY** over the icon and press **ENTER**. The Tide screen (shown below) will appear.

The top left of the screen shows the current time and height according to the

tide graph. The tide graph shows the tidal height range over a 24 hour period. The **CURSOR KEY** allows you to move the dotted lines on the graph to change the height accordingly. Under

```
Time:   12:00
Height: 0.27 Ft        0.51
Aug/14/98 +1           0.43
   31590.83
   56167.92            0.35
                       0.26
                       0.18
                            0 2 4 6 8 10 12 14 16 18 20 22 24
Port Info
Carlo Forte
High Water (max) 0.51 Ft (17:00L)
Low Water (min)  0.18 Ft (09:00L)
Sunrise 05:54L  Sunset 18:59L

SetDate  Today  NextDay PrevDay
```

PORT INFO is the Tide Reference Station name, height of the water (max and min) and the sunrise and sunset for the date and time you have chosen. The softkeys at the bottom of the screen allow you to set the date. Press the desired key
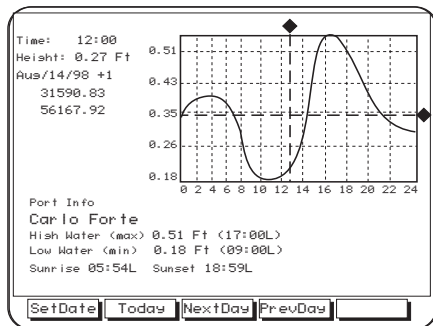
and the tide graph will show the tides for the appointed day.

✋ The C-MAP cartridge needs to be inserted into the receiver in order to obtain the above information.

The receiver can show you information regarding port services such as restaurants, fuel stations, police, etc. From the *Map* screen, press **ENTER**. Press the **LOCPORT** softkey at the bottom of the *Map* screen to locate a port. A screen will appear listing the local services available.

Use the **CURSOR KEY** to highlight the service you want information about and press ENTER to find the name, distance and bearing of the port for the service. The ports are listed in order of nearest proximity to your present position. Again, use the **CURSOR KEY** to highlight your choice and press **ENTER**. A screen appears to give you specifics on the service you have chosen. Press **ESC** to view the *Map* screen with your port location selection shown.

✋ The C-MAP cartridge containing port information is needed for this function.

NAV 1 Screen

From the *Map* Screen, press **Nxt Scrn** to access the *NAV 1* screen
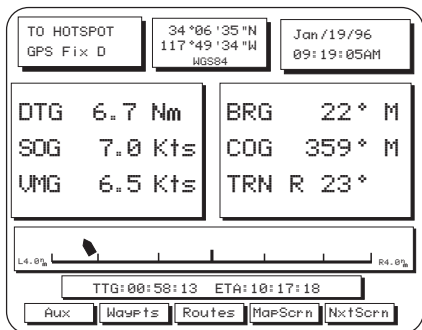
At the top of the *NAV 1* screen is the destination waypoint (if any), and current GPS status, the current position coordinates and datum, the time and date. The position coordinates are based on the setup datum, which you may select under Navigation Setup.

The letter "D" for differential appears next to the GPS status if the last computed fix is differentially corrected (see DGPS in Appendix).

The two large center windows display Distance to Go (DTG), Bearing (BRG), Speed over Ground (SOG), Course over Ground (COG), Velocity made good (VMG), and how many degrees and direction to turn (TRN).

The bottom of the screen displays Time to Go (TTG), Estimated Time of Arrival (ETA), and Course Deviation Indicator (CDI). The boat icon on the CDI points in the direction of COG with respect to Bearing (BRG).

The active softkeys are Aux, Waypts, Routes, MapScrn and Nxt Scrn.

Press **MapScrn** to return to the Map screen or **Nxt Scrn** to switch to the Nav 2 screen.

NAV 2 Screen

From the *NAV 1* screen, press **Nxt Scrn** to access the *NAV 2* screen.
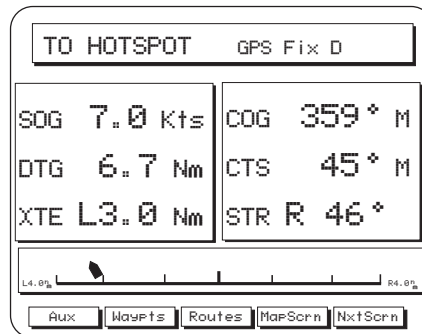
At the top of the screen the name of the destination waypoint (if any) and the current GPS status are displayed. If the last computed fix is differentially corrected, the letter D appears.

The two large center windows display Speed over Ground (SOG), Course over Ground (COG), Distance to Go (DTG), Course to Steer (CTS), Cross Track Error (XTE) and Steering (STR). These fields can be changed to include other information under Navigation Setup.

The bottom of the NAV 2 screen displays a Course Deviation Indicator (CDI). The boat icon on the CDI points in the direction of COG with respect to Bearing (BRG).

The active softkeys are Aux, Waypts, Routes, MapScrn and Nxt Scrn.

Press **MapScrn** to return to the *Map* screen or **Nxt Scrn** to return to the *Satellite Status* screen.

Customizing the Nav 2 *Screen*

In addition to the navigation parameters shown, you may select BRG, Drift, SOA, Set, TRN, and VMG.
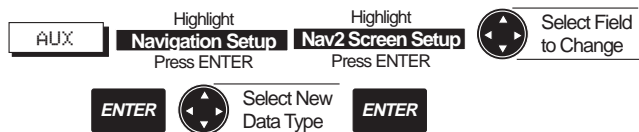
Press the **Aux** softkey, highlight Navigation Setup and press **ENTER**. Highlight Nav 2 Screen Setup and press **ENTER**.

Use the **CURSOR KEY** to highlight the field you wish to change and press **ENTER** to access the complete list of parameters.

Highlight the parameter in the list that you wish to use, then press **ENTER**. Do this for each field that you wish to change, confirming with **ENTER** each time, then press **ESC** three times to return to the Nav 2 screen.

The receiver will not accept an entry of the same parameter more than once.

Waypoints

The Waypoints function allows you to store in memory up to 500 positions, which can be used to build routes by which you navigate.

Waypoints can be created, viewed, edited, deleted, moved, and listed by proximity to the cursor or present position.

Waypoint names can be generated by the receiver or created by the user. In addition, you may choose from 16 different waypoint types, whose icons appear on the map, making them more easily identifiable.

From any NAV screen, press the **Waypts** softkey to access the Waypoints function.

The *Map* screen appears.

If you have stored waypoints in memory, the number of waypoints plotted on the map display depends on the map zoom scale and the proximity of the waypoints to each other.

The cursor shown on the map is an arrow and can be moved using the **CURSOR KEY**.

Softkeys available on the *Waypoints* screen are List, Nearest, Create, Delete and Move.

Press the **ESC** key to exit from the Waypoints screen and return to the root screen.

Creating a Waypoint

The receiver allows you to create waypoints in several ways: graphically, by moving the cursor to the desired location on the map, by saving your current position as a waypoint, by entering coordinates manually, or by pressing the MARK key from any screen to save either your current position or the cursor position. You also have the choice of allowing the unit to automatically name the waypoint, or naming it yourself.

Saving the Cursor Position as a Waypoint

Waypts | Set Cursor Position | Create | Modify or Accept Default Data | Done

From any NAV screen, press the **Waypts** softkey, use the **CURSOR KEY** to move the cursor arrow to the point on the map at which you wish to create a waypoint, and press the **CREATE** softkey.

The Create Waypoint window appears. You can change the waypoint name, waypoint icon, coordinates, description, or you can accept the default values. When the information for the waypoint is correct, press **Done**.

Saving the Current Position Fix as a Waypoint

Waypts | Create | GPS | Modify or Accept Default Data | Done

While the unit is computing fixes, from any root screen, press the **Waypts, Create** softkeys.

The Create Waypoint window appears. Press the **GPS** softkey. The current computed position is entered into the coordinates field. You may modify any of the four fields in the Create Waypoint window. Press **Done** to accept the waypoint.
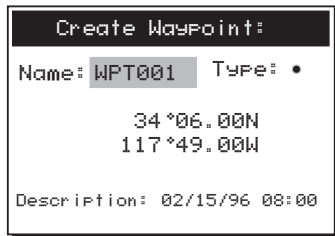
You can also access the create window from the Waypoint List screen.

Modifying Waypoint Data Fields

Each of the four fields in the Create Waypoint window can be modified. Each field is assigned a default value determined by the way in which the window was accessed. You can modify a field or accept the default values.

To modify one of the fields, use the **CURSOR KEY** to highlight the field you wish to modify and press **ENTER.**

The highlight on the first character in the field becomes active. Press up or down on the **CURSOR KEY** to scroll through the alphanumeric character list, press left or right to move the cursor to the next character.

```
Create Waypoint:

Name: WPT001   Type: •

        34°06.00N
       117°49.00W

Description: 02/15/96 08:00
```

If you want to clear the entire name or description line press the **Clear** softkey.

If you want to restore the name or description field to what it was at before you made these changes press the **Restore** softkey. This will not restore the field to its default value, but to whatever value it was when you pressed ENTER to begin this edit.

When you have completed editing the field, press **ENTER**. You may now use the **CURSOR KEY** to move to another field.

Notes on the Data Fields

Name: A receiver-generated name is automatically generated in the format WPTXXX where XXX is a sequential number (001, 002 etc.). This name may be changed to any eight character name.

Type: A • type (icon) is generated as a default for the waypoint. You may change it to anyone of 16 different icons (Dot, Fish, Buoy, Light, Anchor, Flagstaff, Red Daymark, Grn Daymark, Wreck, House, Star, Boat, Fuel, Danger, Diver Down, or Food).

Coordinates: The coordinates may be modified in the manner described above or with the field highlighted you can press the **Cursor** or **GPS** softkey to automatically assign the cursor position or current GPS position fix to the coordinate field. The header of the Create Waypoint window tells you which coordinates are displayed, CURSOR or GPS.

Description: You may enter any description you desire up to 16 characters in this field. The default description is the time and date of the waypoint creation.

Creating a Waypoint Using the MARK key

```
┌────────┐   ┌──────────┐   ┌──────────┐
│  MARK  │   │ Modify or│   │   Done   │
│        │   │  Accept  │   │          │
└────────┘   │Default Data│ └──────────┘
             └──────────┘
```

MARK can be activated from any screen (except the *full map* screen) to create a waypoint at the cursor position or your current position. This is similar to Creating a Waypoint, but does not permit you to manually edit the coordinates. You can, however, either choose the cursor position by pressing the **Cursor** softkey or the current GPS position by pressing the **GPS** softkey.

From any screen except the full map screen, press the **MARK** key.

The Mark GPS Position window appears, or the Mark Cursor Position window appears if the *Map* screen is shown and the cursor is active. You may now modify or accept the default values. Press **Done** to save the waypoint.

Accessing the Waypoint List

From any NAV screen, press the **Waypts**, **List** softkeys to display the catalog of stored waypoints (Waypoint List). This list may continue for several pages if you have stored a large number of waypoints. You may store up to 500 waypoints.

Use the **CURSOR KEY** to scroll up and down the list of waypoints. When the highlight reaches the bottom of a page, it automatically continues on the next page, if one exists. When scrolling up, the highlight automatically continues on the previous page if one exists.
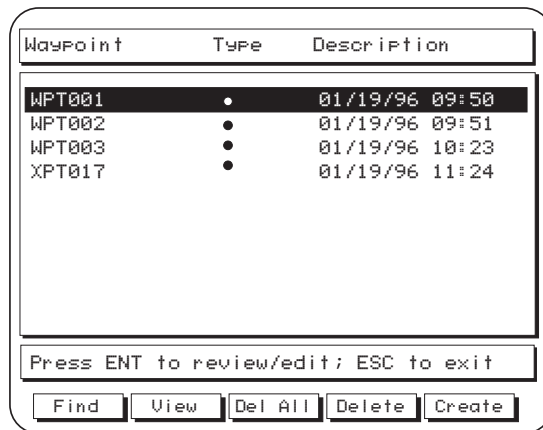
The softkeys available from this screen are the Find, View, Del All , Delete, and Create keys.

Finding a Waypoint in the Waypoint List

From the List screen, you may perform a search to call up a certain waypoint by name. This is particularly useful if you have many pages of stored waypoints and you know the name or type of the one you are looking for.

Press the **Find** softkey. The Find Waypoint window is displayed.

Searching by Name. Press **ENTER** with the Name field highlighted. Use the CURSOR KEY to enter the complete name of the waypoint you are looking for. Press **ENTER** when done and the receiver returns to the Waypoint List with the waypoint highlighted.

💡 The receiver's "fast search" will allow you to select only names that are in the waypoint list. While you are scrolling through the character list, characters that would spell a waypoint name that is not in the list are skipped.

Searching by Type. Alternatively, you can find one or a series of waypoints having a given icon type. Use the **CURSOR KEY** to highlight the TYPE field and press **ENTER.**

The Select Wpt Type window appears, displaying only the waypoint icon types currently in use. Use the **CURSOR KEY** to highlight the type of the waypoint you wish to find. Press **ENTER** when you have selected the icon and the receiver returns to the Waypoint List with all the waypoints with the icon you selected displayed.

To return the Waypoint List to its default configuration (all waypoints displayed) press the **ESC** key.

Viewing a Waypoint from the Waypoint List

This function enables you to view a waypoint from the Waypoint List on the *Map* screen.

From any NAV screen, press **Waypts**, **List**.

Use the **CURSOR KEY** to highlight the waypoint you wish to view and press the **VIEW** softkey.

The display returns to the *Map* screen, with the selected waypoint in the center of the map, under the cursor.

The information window at the left of the map shows the coordinates, bearing/distance from the present position to the waypoint being viewed.

Editing a Waypoint from the Waypoint List

This function enables you to change the name, icon, coordinates, and/or description of a previously saved waypoint.

From any NAV screen, press the **Waypts**, **List** softkeys. Use the **CURSOR KEY** to highlight the waypoint in the list you wish to edit.

Press **ENTER** to edit the highlighted waypoint. The Edit Waypoint window appears. You can change the waypoint name, waypoint icon, coordinates, description, or you can accept the default values. When the information for the waypoint is correct, press **Done**.

Deleting a Waypoint from the Waypoint List

| Waypts | List | ▲▼ Highlight Waypoint | Delete | Confirm Delete |

From any NAV screen press **Waypts**, **List.**

Use the **CURSOR KEY** to highlight the waypoint in the list you wish to delete and press **ENTER**. The Delete Waypoint confirmation screen appears. Highlight YES to delete or NO to exit and press **ENTER**.

> If a waypoint is contained in an active route, it cannot be deleted without first deactivating the route.

> If a waypoint is contained in an inactive route, it can be deleted but the route will be modified. If a waypoint is contained in a single leg route, it can be deleted but the route will be deleted also.

Deleting All Waypoints in the Waypoint List

| Waypts | List | Del All | Confirm Delete |

From any NAV screen press **Waypts**, **List.**

Press the **Del All** softkey. The Delete All Waypoint confirmation screen appears. Highlight YES to delete or NO to exit and press **ENTER**.

Creating a Waypoint from the Waypoint List

This creates a new waypoint using your present position as the default coordinates.

| Waypts | List | Create | Modify or Accept Default Data | Done |

From any NAV screen press **Waypts**, **List.** Press the **Create** softkey.

The Create Waypoint window appears with the current GPS coordinates. You can change the waypoint name, waypoint icon, coordinates, description, or you can accept the default values. When the information for the waypoint is correct, press **Done**.

Viewing Nearest Waypoint

The Nearest function, available from the Waypoints screen, allows you to view a list of the 10 waypoints nearest to your present position or to the cursor position.

| Waypts | Nearest |

From any root screen, press **Waypts**, **Nearest**.

A list of the 10 nearest waypoints is displayed. The screen header indicates whether they are nearest to the cursor position or to your present position (boat).

The softkeys available on the Nearest screen, Cursor and Boat, allow you to toggle between viewing a list of the 10 waypoints nearest the cursor or nearest the present position (boat).

As the help bar indicates, you may Review/Edit a waypoint in the Nearest list as you would in the Waypoint List (see Editing a Waypoint).

Deleting a Waypoint from the Map Screen

| Waypts | Highlight Waypoint | Delete | Confirm Delete |

From the Map screen use the **CURSOR KEY** to move the cursor to an existing waypoint. The Delete softkey will become active and the waypoint information will be displayed in the information window. Press the **Delete** softkey. A delete confirmation window will appear. Highlight YES to delete the waypoint or NO if you change your mind and press **ENTER**.

If a waypoint is contained in an active route, it cannot be deleted without first deactivating the route.

If a waypoint is contained in an inactive route, it can be deleted but the route will be modified. If a waypoint is contained in a single leg route, it can be deleted but the route will be deleted also.

Moving a Waypoint

From the map screen a waypoint can be moved to a different location.

`Waypts` ⊕ Highlight Waypoint `Move` ⊕ Move Waypoint **ENTER**

From any NAV screen, press **Waypts**, and use the **CUR-SOR KEY** to highlight the waypoint on the map you wish move.

Press the **MOVE** softkey.

As the help bar indicates, move the **CURSOR KEY** to the new position on the map where you wish to move the selected waypoint.

As you move the cursor to a new position, a dotted line appears between the old location and the new. Navigation data in the information window at left shows the bearing and distance of the new location with respect to the old, updating the coordinates as you move the cursor.

When you have positioned the cursor at the desired new location, press **ENTER**.

A waypoint used in a route cannot be moved. The waypoint can be moved under Route Edit.

Routes

A route is a planned course of travel defined by a series of waypoints stored in the receiver's memory. These waypoints are then connected to form the segments or "legs" of the route.

There are two kinds of routes: a GOTO route and a multi-leg route. A GOTO is a simple one-leg route, while a multi-leg route may contain up to fifty legs.

The receiver allows you to create and store up to twenty-five multi-leg routes, which can be activated, deactivated, viewed, reversed, edited, copied or deleted.

Creating a GOTO Route from Waypoint List

GOTO `List` ⊕ Highlight Waypoint **ENTER**

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

To select from a list of waypoints, press the **List** softkey.
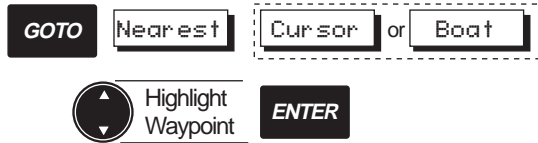
Use the **CURSOR KEY** to highlight the desired destination waypoint from list and press **ENTER**.

Creating a GOTO route automatically deletes any previous GOTO route. If the previous GOTO route was a GOTO MOB, you must confirm to delete it.

On the Map screen, you will notice a solid line showing the GOTO route created from the current position (boat icon) to the selected waypoint.

Creating a GOTO Route from Nearest List

GOTO | Nearest | Cursor or Boat

Highlight Waypoint ENTER

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

To select from a list of the ten nearest waypoints, press the **Nearest** softkey.

Press the **Cursor** softkey to list waypoints nearest to the cursor, or the **Boat** softkey to list waypoints nearest to the present position.

Use the **CURSOR KEY** to highlight the desired destination waypoint from the list and press **ENTER**.

Creating a GOTO route automatically deletes any previous GOTO route. If the previous GOTO route was a GOTO MOB, you must confirm to delete it.

On the Map screen, you will notice a solid line showing the GOTO route created from the current position (boat icon) to the selected waypoint.

Creating a GOTO Route by Waypoint Name

GOTO | Name | Enter Name | ENTER

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

Press the **Name** softkey to enter the name of the waypoint to which you wish to travel.

The Wayp Name window appears, showing the first waypoint that exists, alphabetically, in the Waypoint list.

Use the **CURSOR KEY** to enter the waypoint name.

Press **ENTER**.

Creating a GOTO route automatically deletes any previous GOTO route. If the previous GOTO route was a GOTO MOB, you must confirm to delete it.

On the Map screen, you will notice a solid line showing the GOTO route created from the current position (boat icon) to the selected waypoint.

Creating a GOTO Route to the Cursor Position

GOTO	(cursor) Move cursor to destination	ENTER	Modify or Accept Default Data — Done

Only if destination is not an existing waypoint

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

Move the cursor over the desired destination point and press **ENTER**.

If no waypoint already exists at the cursor position, the Create GOTO Waypoint window appears.

Use the **CURSOR KEY** and **ENTER** to modify the name, type and description, if desired, and press **Done.**

💡 Creating a GOTO route automatically deletes any previous GOTO route. If the previous GOTO route was a GOTO MOB, you must confirm to delete it.

A solid line shows the GOTO route created from the present position to the cursor position.

Creating a MOB Route

GOTO	MOB

The **MOB**, or Man Overboard, function allows you to instantly create a GOTO route to the position at which you press the GOTO key and MOB softkey.

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

Press the **MOB** softkey.

A GOTO MOB has been created to the position at which you pressed the MOB softkey.

💡 When a GOTO MOB has been created, it remains in memory until you set another route or GOTO. A confirmation window then appears: Activate New GOTO, Delete GOTO MOB?

Deleting a GOTO Route

GOTO	ESC	Confirm Delete

Press **GOTO** from any screen except the *Auxiliary* and *full map* screens. The *Map* screen appears.

Press **ESC**.

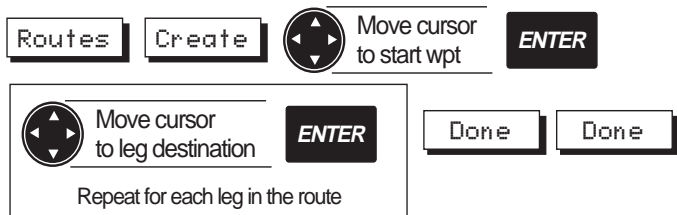The Exit from GOTO confirmation window appears.

Highlight YES and press **ENTER**.

The GOTO is deleted.

Multi-leg Routes

The receiver allows you to create multi-leg routes, which can be used again and again, activated, deactivated, reversed, edited, copied or deleted.

Creating a Multi-Leg Route Using the Map

| Routes | Create | ▲◀▶▼ Move cursor to start wpt | ENTER |

| ▲◀▶▼ Move cursor to leg destination | ENTER | Done | Done |
| Repeat for each leg in the route |

Note: If the start waypoint or any leg destination waypoint is not in the receiver's memory, you will be given a window allowing you to create the new waypoint.

Use this function to create a route from existing waypoints or create them as you go on the screen.

From any root screen, press the **Routes, Create** softkeys.

Move the cursor over the starting waypoint and press **ENTER**.

Now move the cursor over the next waypoint in the route and press **ENTER**. A line appears on the map, connecting the first point to the second, and so on. Continue to add waypoints to the route until you have completed it, then press the **Done** softkey.

Press **ESC** to exit the routes function.

To add a leg to the route at a location where no waypoint yet exists, see Appending a Waypoint.

Creating a Multi-Leg Route (Text Mode)

| Routes | Create | Txt Crt | Modify or Accept Default Comment | ▲▼ Highlight start field |

| ENTER | ▲▼ Select Waypoint | ENTER |

| ▲▼ Highlight next field | ENTER | ▲▼ Select Waypoint | ENTER |
| Repeat for each leg in the route |

| Done | Done |
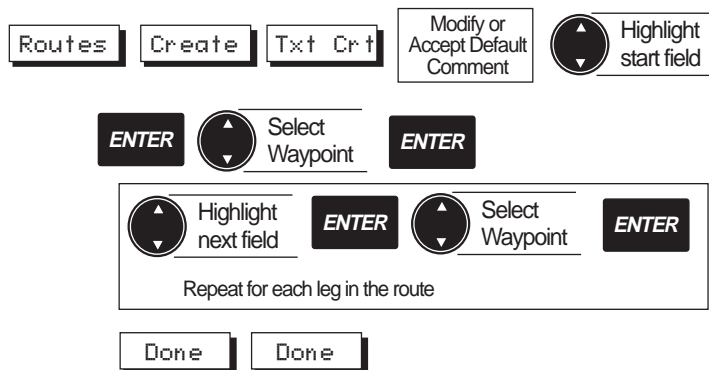
From any NAV screen, press the **Routes, Create, Txt Crt** softkeys.

The *Create Route* screen appears showing the number of the first available route in the screen header, "Create Route x." Below is a comment field containing time and date of creation.

Below is a table where you enter waypoints to form the legs of the route. The table shows leg numbers, waypoint names, distance and bearing.

You will notice that the numbers at the left side appear *between* the lines. This is because a leg is defined as the distance from one waypoint in the route to the next.

Press **ENTER** and use the **CURSOR KEY** to change the comment, if desired and press **ENTER** when finished.

Use the **CURSOR KEY** to highlight the first field of the first leg in the route and press **ENTER**.

A window displaying the waypoint list appears. Use the **CURSOR KEY** to select the starting waypoint of the route and press **ENTER**.

The selected waypoint appears in the first field.

Use the **CURSOR KEY** to step down to the next line and press **ENTER**.

Select the next waypoint and press **ENTER**.

Continue to select waypoints to complete the route, (up to 50 legs). When you have finished, press the **Done** softkey.

Press **Done** and then **ESC** to return to the previous NAV screen.

When selecting waypoints from the list, if the list is long, you can press the right arrow on the Cursor key to access the Find Waypoint function, which allows you to enter the name of the waypoint. You can also use Find Waypoint to list waypoints of a specific type in order to narrow the search process.

Activating a Route

From any NAV screen, press the **Routes, List** softkeys.

Use the **CURSOR KEY** to highlight the route you wish to activate and press the **Activte** softkey.

An arrow appears next to the route number in the list, and a window appears briefly : "Route x is the active route"

```
Rte  Start     End       Description

  1  CAMP      LAKE01    21:37:23 01/22/96
  2  WPT002    WPT006    32:46:15 01/22/96
→ 3  LAKE03    WPT010    10:14:31 01/20/96
  4  _____  _____  _____
  5  _____  _____  _____
  6  _____  _____  _____
  7  _____  _____  _____
  8  _____  _____  _____
  9  _____  _____  _____
 10  _____  _____  _____

Press ENT to review/edit route

Active  Create   Copy   Reverse  Delete
```

The route which was previously active, if any, has been deactivated.

When a route is activated, the unit automatically determines which leg to navigate on based on present position. If the route being activated was previously active, the unit automatically activates the leg that was previously active if it is still valid. The user can also activate a specific leg within the route under Text Edit (see Activating a Leg of a Route).

Press **ESC** to exit the Routes function.

After a route has been activated, when viewing the map screen, press CTR to center the boat on the map in order to get navigation information for the route.

Deactivating a Route

Routes   List   (Highlight route)   Deactiv

From any NAV screen, press the **Routes, List** softkeys.

Use the **CURSOR KEY** to highlight the activated route that you wish to deactivate and press the **Deactiv** softkey.

The arrow to the left of the route number in the list disappears and the route has been deactivated.

The display remains on the Route list screen.

Press **ESC** twice to exit the Routes function.

Reversing a Route from the Map Screen

The receiver allows you to reverse the order of waypoints in a route.

Routes   Reverse

While viewing an inactive route on the *Map* screen, press the **Routes**, **Reverse** softkeys.

The route you were viewing is reversed.

An active route cannot be reversed.

Press **ESC** to exit the Routes function.

Reversing a Route from the List

Routes		List		▲ Highlight route ▼		Reverse

From any NAV screen, press the **Routes, List** softkeys.

Use the **CURSOR KEY** to highlight the inactive route you wish to reverse and press the **Reverse** softkey.
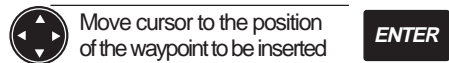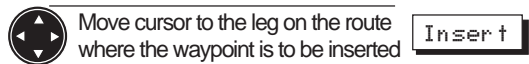
The route is reversed.

Press **ESC** twice to exit the Routes function.

Editing a Route

Editing a route allows you to insert, delete, append, replace and move waypoints in a route.

Inserting a Waypoint in a Route

Routes		List		▲ Highlight route ▼		ENTER

Move cursor to the leg on the route where the waypoint is to be inserted   Insert

Move cursor to the position of the waypoint to be inserted   ENTER

> If the chosen position is not an existing waypoint, a window will be displayed to create a new waypoint for that position.

From any NAV screen, press **Routes**, **List** softkeys.

Use the **CURSOR KEY** to highlight the route in which you wish to insert a waypoint and press **ENTER**.

💡 To edit the *active* route a shortcut is to press **Routes, Edit**.

Use the **CURSOR KEY** to move the cursor close to the course line near the point you wish to insert a waypoint in the route.

The Insert softkey becomes active. The help bar displays "Press Insert to edit route."

💡 The cursor must be in close proximity to the course line in order for the Insert softkey to be active on the screen.

Press the **Insert** softkey, then use the **CURSOR KEY** to move to the exact position you want to insert an existing or to-be-created waypoint before presssing **ENTER**.

If a waypoint does not already exist at that point, the Insert Waypoint window appears.

Press **ENTER** and use the **CURSOR KEY** to modify the name, type and description if desired.

If you want to add an *existing* waypoint to the route, you must still move the cursor near the course line, activate the Insert softkey, then move the cursor to the waypoint to insert and press ENTER.

When you have finished, press the **Done** softkey.

The inserted waypoint appears at the position you placed it on the map. Press **Done** to exit Route Edit.

Removing a Waypoint from a Route

Routes → List → Highlight route → ENTER
Move cursor to the waypoint in the route to be removed → Remove

From any NAV screen, press **Routes**, **List** softkeys.

Use the **CURSOR KEY** to highlight the route in which you wish to delete a waypoint and press **ENTER**.

To edit the *active* route a shortcut is to press **Routes, Edit**.

Use the **CURSOR KEY** to place the cursor over the waypoint in the route that you wish to remove.
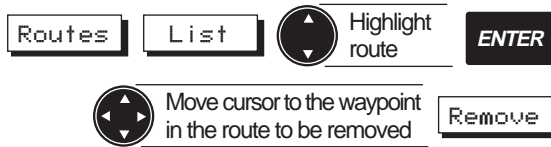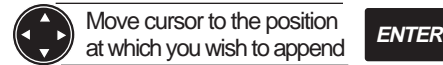
Press the **Remove** softkey.

The waypoint is removed from the route, however it continues to exist as a waypoint in the waypoint list and on the map.

Press **Done** to exit Route Edit.

Appending a Waypoint to the End of a Route

Routes → List → Highlight route → ENTER
Move cursor to the position at which you wish to append → ENTER
If chosen point is not an existing waypoint, a window will be displayed to create a new waypoint for that position.

From any NAV screen, press the **Routes**, **List** softkeys.

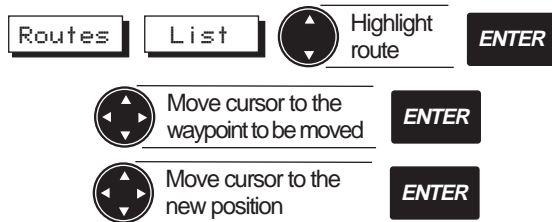Use the **CURSOR KEY** to highlight the route in which you wish to append a waypoint to the end and press **ENTER**.

To edit the *active* route a shortcut is to press **Routes, Edit**.

Use the **CURSOR KEY** to place the cursor at the position where you wish to add a waypoint to the end of the route.

The help bar indicates "Use ENT to append wpts to route."

Press **ENTER**.

If a waypoint does not exist at the cursor position, the Append Waypoint window appears. Press **ENTER** and use the **CURSOR KEY** to modify the name, type and description if desired. When you have finished, press the **Done** softkey. Press **Done** to exit Route Edit.

The waypoint you created or selected at the cursor position has been added to the end of the route.

Moving a Waypoint in a Route

From any NAV screen, press the **Routes**, **List** softkeys.

Use the **CURSOR KEY** to highlight the route in which you wish to move a waypoint and press **ENTER**.

To edit the *active* route a shortcut is to press **Routes, Edit**.

Use the **CURSOR KEY** to highlight the waypoint in the route that you wish to move and press the **Move** softkey.

Now use the **CURSOR KEY** to move the cursor to the position to which you wish to move the waypoint and press **ENTER**. As you move the **CURSOR KEY**, the distance and bearing from the original waypoint position to the cursor is updated continuously.

The waypoint is moved from the old position to the new. Waypoints are movable, whether or not they are contained in an active route.

Replacing a Waypoint in a Route Using Text Edit
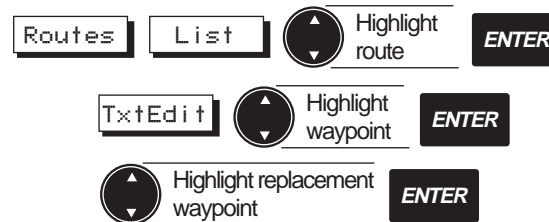
From any NAV screen, press the **Routes**, **List**, and use the **CURSOR KEY** to select the route in which you wish to

replace a waypoint. Press **ENTER**, then press the **Txt Edit** softkey.

If you wish to replace a waypoint in the active route, simply press **Route, Edit, Txt Edit** softkeys.

Use the **CURSOR KEY** to highlight the waypoint you wish to replace and press **ENTER**.
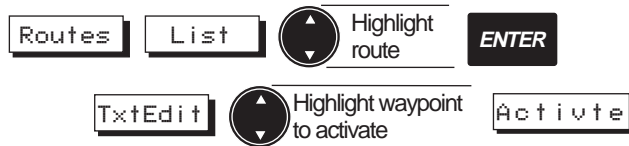
The waypoint list appears.

Select the waypoint you wish to use to replace the one you highlighted and press **ENTER**.

The waypoint you select in the waypoint list replaces the one you highlighted in the route.

If the list is very long, you may access the Find Waypoint function in this list by pressing the *right arrow* on the **CURSOR KEY**.

Activating a Leg of a Route

From any root screen, press the **Routes**, **List**, and use the **CURSOR KEY** to select the route in which you wish to activate a leg. Press **ENTER**, then press the **Txt Edit** softkey.

If you wish to activate a leg in the active route, simply press **Route, Edit**, **Txt Edit** softkeys.

Use the **CURSOR KEY** to highlight the destination waypoint of the leg you wish to activate in the route.

Press the **Activte** softkey.

If a leg is activated, an arrow appears next to the leg and Active appears on the right of the header window.

The Activte softkey then changes to Deactiv.

Activating a leg of an inactive route automatically activates the route itself. Any multi-leg route which was previously active is deactivated.

To deactivate the route you can use the **Deactiv** softkey that appears on the *Txt Edit* screen or the *Routes List* screen.

Deleting a Route on the Map

Routes | **Delete** | Confirm Delete

While viewing an inactive route on the *Map* screen, press the **Routes**, **Delete** softkeys.

A confirmation window appears.

"Delete Route.   Are you sure? YES   NO"

Highlight YES and press **ENTER**.

The route you were viewing is deleted (the waypoints, however, remain in memory).

An active route cannot be deleted.

Deleting a Route in the List

Routes | **List** | Highlight route | **Delete** | Confirm Delete

From any NAV screen, press the **Routes, List** softkeys.

Use the **CURSOR KEY** to highlight the route you wish to delete and press the **Delete** softkey.

A confirmation window appears.

"Delete Route.   Are you sure? YES   NO"

Highlight YES and press **ENTER**.

The route is deleted.

An active route cannot be deleted.

Copying a Route

Routes | **List** | **Copy** | Highlight route | **ENTER**

From any NAV screen, press the **Routes, List, Copy** softkeys.

Use the **CURSOR KEY** to highlight the route you wish to copy and press **ENTER**.

A window appears briefly: "Route x was copied to route y"and the display returns to the route list.

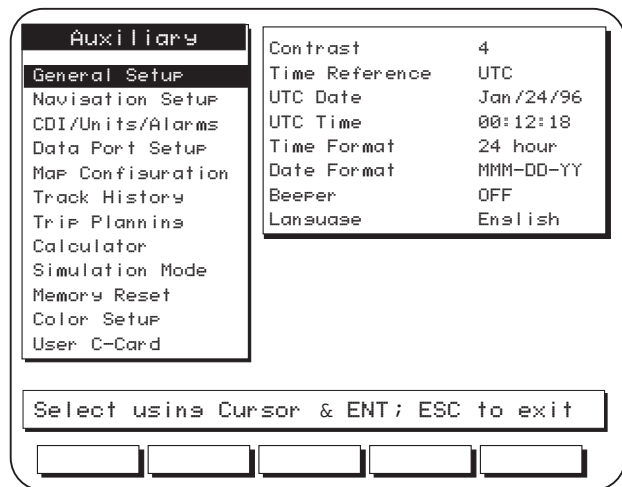The route you highlighted was copied to the first available route.

If there are already 25 existing routes, the Copy function is not available. You must first clear a route before copying.

The receiver offers various auxiliary functions that are accessible from any of the four NAV screens by pressing the Aux softkey. From the Aux Screen you are able to customize the receiver, access a calculator, or put the receiver into a simulation mode.

The Aux Screen

To access the Aux Screen press the **Aux** softkey from any of the four NAV screens.

```
┌──────────────────────────────────────────────┐
│  Auxiliary        Contrast        4           │
│ ┌──────────────┐  Time Reference  UTC         │
│ │General Setup │  UTC Date        Jan/24/96    │
│  Navigation Setup UTC Time        00:12:18     │
│  CDI/Units/Alarms Time Format      24 hour     │
│  Data Port Setup Date Format      MMM-DD-YY    │
│  Map Configuration Beeper         OFF          │
│  Track History   Language        English       │
│  Trip Planning                                 │
│  Calculator                                    │
│  Simulation Mode                               │
│  Memory Reset                                  │
│  Color Setup                                   │
│  User C-Card                                   │
│                                                │
│  Select using Cursor & ENT; ESC to exit        │
│                                                │
│  ┌────┐ ┌────┐ ┌────┐ ┌────┐ ┌────┐            │
│  └────┘ └────┘ └────┘ └────┘ └────┘            │
└──────────────────────────────────────────────┘
```

To select the desired Aux function scroll down to highlight the function using the **CURSOR KEY**, then press **ENTER**.

When an auxiliary function is highlighted by the cursor, a window to the right shows the contents of that function and its corresponding settings.

💡 Since the Trip Planning function requires the full screen, you must press **ENTER** to view the Auxiliary Trip Planning screen.

Press **ENTER** when an Aux function is highlighted to move the cursor to the window on the right. The highlight appears on the menu item accessed the previous time.

To exit Aux, press **ESC**.

General Setup Function

General Setup allows you to set time and date and their format, control screen contrast, activate and deactivate the beeper.

```
┌──────────────────────────────┐
│ Contrast        4            │
│ Time Reference  UTC          │
│ UTC Date        Jan/24/96    │
│ UTC Time        00:12:18     │
│ Time Format     24 hour      │
│ Date Format     MMM-DD-YY    │
│ Beeper          OFF          │
│ Language        English      │
└──────────────────────────────┘
```

Adjusting Contrast

The contrast can be changed for best screen viewing.

Press the **Aux** softkey, highlight General Setup using the **CURSOR KEY** and press **ENTER**. Highlight Contrast and press **ENTER** to display the contrast scale adjustment bar.

Use the **CURSOR KEY** to change contrast and press **ENTER** to confirm. Press **ESC** to exit.

Default setting: **20**

Setting Time Reference

Time can be referenced to either Universal Time Coordinates (UTC, Greenwich Mean Time in Greenwich, England) or local time. For local time, you must enter the hourly offset from UTC to Local (local minus UTC). Use the world map included with the unit to calculate the offset.

Press the **Aux** softkey, highlight General Setup using the **CURSOR KEY**, press **ENTER**, highlight Time Reference, press **ENTER** and a window opens that lists UTC, Local. Use the **CURSOR KEY** to select an option and press **ENTER**. If local is chosen, use the **CURSOR KEY** to input Local Offset in hours and press **ENTER**.

Press **ESC** to exit.

Default setting: **UTC**

Initializing Date/Time

In order for the receiver to locate satellites and compute position fixes within a short period of time (less than 1 minute), it must have the correct UTC (Universal Time Coordinates or Greenwich Mean Time in Greenwich, England) time and date.

If you are unsure about the UTC time/date, do not enter UTC time/date during initialization. Simply wait about 6 minutes and the unit will automatically get the UTC time/date from the satellites and then compute a position fix.

Press the **Aux** softkey, highlight General Setup using the **CURSOR KEY** and press **ENTER**. Highlight UTC Date and press **ENTER** to display a window showing the current UTC date.

Use the **CURSOR KEY** to select numbers and move between day, month and year. When you have finished, press **ENTER** to set.

Use the **CURSOR KEY** to highlight UTC Time, press **ENTER**. A window opens that shows the current UTC time.

Use the **CURSOR KEY** to select numbers and move between hours, minutes and seconds. When you have fin-

ished, press **ENTER** to set. Press **ESC** twice to exit Aux. It is only necessary to set the UTC time to within 15 minutes of the correct UTC time.

Setting Time Format

Time can be shown as 24 hours or 12 hours (AM/PM).

Press the **Aux** softkey, highlight General Setup using the **CURSOR KEY**, and press **ENTER**. Highlight Time Format and press **ENTER** to display a window with the options 24, 12.
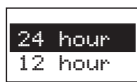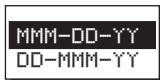
Use the **CURSOR KEY** to select and press **ENTER**. Press **ESC** to exit.

Default setting: **24 hour**

Setting Date Format

Date can be shown as Month-Day-Year or Day-Month-Year.

Press the **Aux** softkey, highlight General Setup using **CURSOR KEY**, and press **ENTER**. Highlight Date Format, press **ENTER** and a window opens that lists MMM-DD-YY and DD-MMM-YY.

Use the **CURSOR KEY** to highlight your choice and press **ENTER** to accept. Press **ESC** to exit.

Default setting: **MMM-DD-YY**.

Turning the Beeper On or Off

The beeper can be turned on and off.

Beeper activation is independent of alarm control.

Press the **Aux** softkey, highlight General Setup using the **CURSOR KEY** and press **ENTER**. Highlight Beeper, press **ENTER** and a window opens shows On/Off. Use the **CURSOR KEY** to select one and press **ENTER**.

Press **ESC** to exit.

Default setting: **On**

Language Setting

The receiver supports five languages: English, Italian, French, German and Spanish.

Press the Aux softkey, highlight General Setup using the **CURSOR KEY** and press **ENTER**. Highlight Language, press ENTER and a window opens listing the languages.
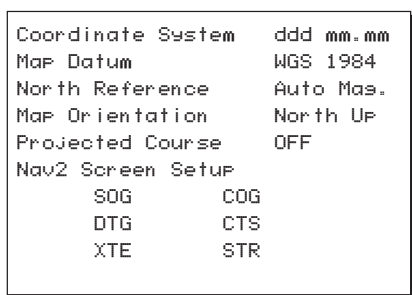
Use the CURSOR KEY to select one and press ENTER.

Press ESC to exit.

Default setting: **English**

```
English
Italiano
Francais
Deutsch
Espanol
```

Navigation Setup

The Navigation Setup menu enables you to change the coordinate system, map datum, north reference, map orientation, and NAV 2 screen setup. It also activates or deactivates course projection.

```
Coordinate System    ddd mm.mm
Map Datum            WGS 1984
North Reference      Auto Mag.
Map Orientation      North Up
Projected Course     OFF
Nav2 Screen Setup
        SOG     COG
        DTG     CTS
        XTE     STR
```

Selecting Coordinate System

Position coordinates displayed on the *NAV1* screen and waypoint coordinates displayed on the waypoint screen can be based on latitude/longitude, Universal Transverse Mercator (UTM), Ordinance Survey of Great Britain (OSBG) or Loran TD's. If latitude/longitude is selected, the position can be displayed in Degrees, Minutes, Seconds or Degrees, Minutes and fractions of minutes to 2 or 3 digits of resolution, (ddd mm.mm or ddd mm.mmm).

The important difference between Deg/Min/Sec and Deg/Min/Fractions is that there are 60 seconds in one minute of latitude or longitude (the seconds value will always be between 00 and 59), whereas fractions of a minute are expressed in decimal format (from .00 to .99, or .000 to .999).

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Navigation Setup, and press **ENTER**. Use the **CURSOR KEY** to highlight Coordinate System, and press **ENTER**.

```
ddd mm.ss
ddd mm.mm
ddd mm.mmm
UTM
OSGB
TD
```
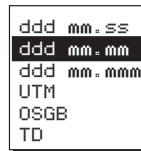
Use the **CURSOR KEY** to highlight desired coordinate system and **ENTER** to set.

If TD's is selected, the chain and pair must be chosen.

The ASF value can be set to correct the coordinates in case of map shift 0.0 to 9.9.

```
TD Settings
Chain: 9970
Pair:  X Y
ASF 1: +0.0
ASF 2: +0.0
Prime: ON
```
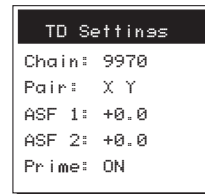
Turn Prime OFF if the coordinate position does not correspond to the chart position. (Since two solutions are possible, mathematically, in certain rare cases the second calculation is the more accurate of the two.) Press **ESC** to exit.

Default setting: **latitude/longitude, ddd mm.mm**   (Fractions of mins to 2 places resolution)

Selecting Map Datum

The receiver allows selecting from 93 different map datums.

All information dislayed on the map screen is based on WGS84. Only position coordinates displayed on the NAV1 screen and waypoint coordinates entered manually (not through the map) are based on the map datum selected by the user through the Aux function.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Navigation Setup and press **ENTER**. Use the **CURSOR KEY** to highlight Map Datum and press **ENTER**. Use the **CURSOR KEY** to highlight the desired map datum and **ENTER** to set. Press **ESC** to exit.

Default setting: **WGS 1984**

Selecting North Reference

Direction related information such as COG, BRG, CTS and Set can be referenced to True North or Magnetic North (Auto Mag.).

Press the **Aux** softkey, highlight Navigation Setup using **CURSOR KEY**, press **ENTER**, highlight North Reference using the **CURSOR KEY**, press **ENTER**. Use the CURSOR KEY to highlight True or Auto Mag. and **ENTER** to accept. Press **ESC** to exit.

Default setting: **Auto Mag.**

Selecting Map Orientation

When navigating on the map, there are two methods of orienting the map and the boat icon.

When Map Orientation is set to North Up, the boat icon rotates according to its COG direction, with respect to north; the map does not rotate.
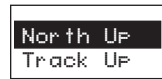
When Map Orientation is set to Track-Up, the boat icon always points up while the map rotates so the top of the screen is always the COG direction. The map rotates every time COG changes more than the specified number of degrees set.
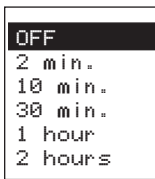
Press the **Aux** softkey, highlight Navigation Setup using the **CURSOR KEY**, press **ENTER**, highlight Map Orientation using the **CURSOR KEY**, and press **ENTER**. Use the **CURSOR KEY** to highlight North Up or Track Up and press **ENTER** to accept. If Track Up is selected, the resolution of rotation must be entered (the default is 10°). Press **ESC** to exit.

Default setting: **North Up**

Setting Projected Course

The position of the boat can be projected ahead in time based on current COG and SOG. The projected course is represented by a solid line extending from the boat in the direction of its COG and terminated with an ⊕.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Navigation Setup and press **ENTER**. Use the **CURSOR KEY** to highlight Projected Course and press **ENTER**. The course can be projected ahead over 2 min., 10 min., 30 min., 1 hour, or

OFF
2 min.
10 min.
30 min.
1 hour
2 hours

2 hours. Use the **CURSOR KEY** to highlight and **ENTER** to accept. Press **ESC** to exit.

Default setting: **OFF**

NAV 2 Screen Setup

The NAV 2 screen can be customized to display six different navigation parameters chosen from a list of 12.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Navigation Setup and press **ENTER**. Use the **CURSORY KEY** to highlight Nav 2 Screen Setup and press **ENTER**. Use the **CURSOR KEY** to select the parameter you wish to change

Nav2 Screen Setup	
BRG	Set
COG	SOG
CTS	STR
Drift	TRN
DTG	VMG
SOA	XTE
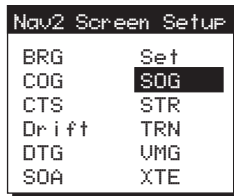
and press **ENTER**.

Use the **CURSOR KEY** to highlight one of the following parameters: BRG, COG, CTS, Drift, DTG, SOA, Set, SOG, STR, TRN, VMG, XTE. Press **ENTER** to accept.

Use the same procedure to change as many parameters as you wish. Press **ESC** twice to exit.

Default settings: **SOG, DTG, XTE, COG, CTS, STR**

CDI/Units/Alarms Function

This menu allows you to set CDI scale, choose distance, speed and depth units, and set alarms for arrival radius, anchor, cross track error and test.

| CDI Scale	0.5 Nm
Distance Units	Nm
Speed Units	Kts
Depth Units	Ft
Alarm Activated	ON
Arrival Radius	OFF
Anchor Alarm	OFF
XTE Alarm	OFF
Test Alarm	OFF
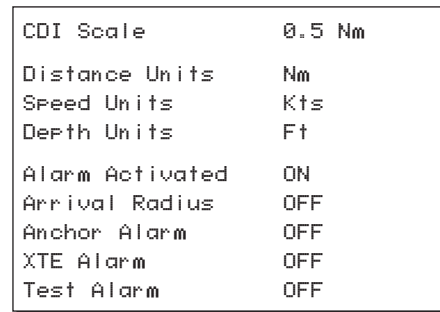
Selecting CDI Scale

The scale (maximum offset) of the CDI displayed on the Nav 1 and Nav 2 screens can be set to 0.2, 0.5, 1.0, 2.0, 4.0, 10.0 distance units (Nm, Mi, or Km depending on the distance units setting).

Press the **Aux** softkey, highlight CDI/Units/ Alarms and press **ENTER**, highlight CDI Scale using **CURSOR KEY**, press **ENTER**.

```
0.2
0.5
1.0
2.0
4.0
10.0
```

Use the **CURSOR KEY** to select desired scale and press **ENTER**. Press **ESC** to exit.
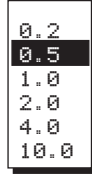
Default setting: **0.5**

Setting Distance Units

Distance units can be set to Nautical Miles, Statute Miles, or Kilometers.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight CDI/Units/Alarms and press **ENTER**. Use the **CURSOR KEY** to highlight Distance Units and press **ENTER**.

```
Nm
Mi
Km
```

Use the **CURSOR KEY** to select desired units and press **ENTER**. Press **ESC** to exit.

Default setting: **Nautical miles (Nm)**

Setting Speed Units

Speed units can be set to Knots, Miles Per Hour, or Kilometers Per Hour.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight CDI/Units/Alarms and press **ENTER**. Use the **CURSOR KEY** to highlight Speed Units and press **ENTER**.

```
Kts
Mph
Kph
```

Use the **CURSOR KEY** to select desired units and press **ENTER**. Press **ESC** to exit.

Default setting: **Knots (Kts)**

Setting Depth Units

Depth units can be set to Feet, Fathoms or Meters.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight CDI/Units/Alarms and press **ENTER**. Use the **CURSOR KEY** to highlight Depth Units and press **ENTER**.

```
Ft
FM
m
```

Use the **CURSOR KEY** to select desired unit and press **ENTER**. Press **ESC** to exit.

Default setting: **Feet (Ft)**

Activating Alarms

The internal/external alarm can be turned on/off. Turning the Alarm Activated off does not clear the values set for Arrival Radius, Anchor Alarm and XTE Alarm from memory. They are retained and shown again when Alarm Activated is on again.

Beeper activation is independent from the alarm.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight CDI/Units/Alarms and press **EN-TER**. Use the **CURSOR KEY** to highlight Alarm Activated and press **ENTER**.

Use the **CURSOR KEY** to select on or off and press **EN-TER**. Press **ESC** to exit.

Default setting: **ON**

Setting Arrival Radius

If the alarm is on, it will sound when the boat comes within a certain distance of the destination waypoint(s) of the route. The arrival radius can be set between 0.01 and 9.99 distance units.

Press the **Aux** softkey, use the **CUR-SOR KEY** to highlight CDI/Units/Alarm and press **ENTER**. Use the **CURSOR KEY** to highlight Arrival Radius and press **ENTER**.

Use the **CURSOR KEY** to select desired radius and press **ENTER**. Press **ESC** to exit.

Default setting: **OFF**

Setting Anchor Alarm

While the unit is computing position fixes, the alarm will sound when the boat has moved more than a certain distance from the position where the alarm was activated. The anchor radius can be set between 0.01 and 9.99 distance units.

Press the **Aux** softkey, use the **CUR-SOR KEY** to highlight CDI/Units/Alarms and press **ENTER**, highlight Anchor Alarm using the **CURSOR KEY**, press **ENTER**.

Use the **CURSOR KEY** to select desired radius and press **EN-TER**. Press **ESC** to exit.

Default setting: **OFF**

Setting XTE Alarm

If the alarm is on, it will sound when the boat has exceeded a certain XTE. The XTE can be set from 0.01 to 9.99 distance units.

Press the **Aux** softkey, use the **CUR-SOR KEY** to highlight CDI/Units/Alarms and press **ENTER**. Use the **CURSOR KEY** to highlight XTE Alarm and press **ENTER**.

```
XTE Alarm
OFF
```

Use the **CURSOR KEY** to select the desired XTE value and press **ENTER**. Press **ESC** to exit.

Default setting: **OFF**

Turning Test Alarm On or Off

The alarm allows you to test the internal and external alarm (if installed).

Press the **Aux** softkey, use the **CURSOR KEY** to highlight CDI/Units/Alarms and press **ENTER**. Use the **CURSOR KEY** to highlight Test Alarm and press **ENTER**. Use **CURSOR KEY** to set on or off and press **ENTER**. Press **ESC** to exit.

```
OFF
ON
```
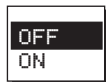
Default setting: **OFF**

Data Port Setup Functions

Setting NMEA Output

The receiver can output NMEA messages to interface with external devices such as autopilots and fish finders.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Data Port Setup and press **ENTER**. Use the **CURSOR KEY** to highlight NMEA Output and press **ENTER**.
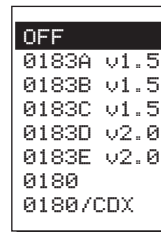
```
NMEA Output      OFF
Baud Rate        4800

NMEA Input       OFF
Baud Rate        4800

Differential Input
Baud Rate        4800
```

The available outputs are NMEA 0180, 0180/CDX, 0183A (v1.5), 0183B (v1.5), 0183C (v1.5), 0183D (v2.0), or 0183E (v2.0).

Use the **CURSOR KEY** to select and press **ENTER**. Press **ESC** to exit.

Make sure the correct baud rate is selected for the setting chosen. The standard baud rate is 1200 for NMEA 0180 and 4800 for NMEA 0183.
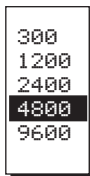
```
OFF
0183A v1.5
0183B v1.5
0183C v1.5
0183D v2.0
0183E v2.0
0180
0180/CDX
```

Default setting: **OFF**

Changing NMEA Output Baud Rate

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Data Port Setup and press **ENTER**. Use the **CURSOR KEY** to highlight Baud Rate below NMEA Output and press **ENTER**. The baud rate can be set to 300, 1200, 2400, 4800, or 9600. Use the **CURSOR KEY** to select and press **ENTER**. Press **ESC** to exit.
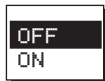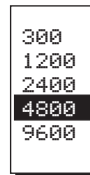
Default setting: **4800**

Turning NMEA Input On or Off

Input from the boat's speed log and compass can be used for actual current calculation. Turning NMEA input on disables manual input of speed log and heading under Calculator - Actual Current.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Data Port Setup and press **ENTER**. Use the **CURSOR KEY** to highlight NMEA Input and press **ENTER**. Use the **CURSOR KEY** to select on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **OFF**

Changing NMEA Input Baud Rate

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Data Port Setup and press **ENTER**. Use the **CURSOR KEY** to highlight Baud Rate below NMEA Input and press **ENTER**. The baud rate can be set to 300, 1200, 2400, 4800, or 9600.
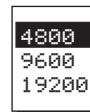
Use the **CURSOR KEY** to select the desired baud rate and press **ENTER**. Press **ESC** to exit.

Default setting: **4800**

Setting Differential Input Baud Rate

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Data Port Setup and press **ENTER**. Use the **CURSOR KEY** to highlight Baud Rate under Differential Input and press **ENTER**. The baud rate can be set to 4800, 9600 or 19200.

Use the **CURSOR KEY** to select the desired baud rate and press **ENTER**. Press **ESC** to exit.

Default setting: **4800**

Map Configuration Functions

The Map can be configured to show the objects that best suit your navigation needs. Object attributes can be viewed on the map screen if the object is turned on in Map Configuration.

```
Land Settings Menu
Marine Settings Menu
Nav-Aids and Features Menu
Other Settings Menu
Chart Settings
```

💡 C-MAP's cartography closely matches the source charts and their scales in order to give the user the most accurate digital chart navigation capability. As you pan over the map, you may notice the scale changing slightly even though a zoom-in or zoom-out is not performed. This happens because you are moving between charts that use different scales.

Turning Land Settings On and Off

Land icons shown on the map can be turned on and off. They include Natural Features such as dunes, hills, vegetation, and salt pans; Rivers and Lakes; Cultural Features, such as airports, bridges, roads, railways, cables, and pipelines; and Landmarks, such as buildings, water tanks etc.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Map Configuration Functions and press **ENTER**. Use the **CURSOR KEY** to highlight Land Settings Menu and press **ENTER**.

```
Land Settings Menu
Natural Features        ON
Rivers & Lakes          ON
Cultural Features       ON
Landmarks               ON
```

Use the **CURSOR KEY** to select the feature you wish to activate or deactivate and press **ENTER**.

Use the **CURSOR KEY** to highlight on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON**

Turning Marine Settings On and Off

Marine features icons shown on the map can be turned on and off. They include Tides and Water Turbulence, Bathymetric Lines, Depth Areas Limits (depth contours, dredged and intertidal areas); Bathymetrics and Soundings Range, Spot Soundings, and Bottom Type.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Map Configuration Functions and press **ENTER**.

Use the **CURSOR KEY** to highlight Marine Settings Menu and press **ENTER**.

```
Marine Settings Menu
Tide & Water Turbulence  ON
Bathymetric Lines        ON
Depth Areas Limits       00033 ft
Bathymetrics and Soundings Range
      00000 ft - 00033 ft
Spot Soundings           ON
Bottom Type              ON
```

Use the **CURSOR KEY** to select the feature you wish to activate or deactivate and press **ENTER**. Use the **CURSOR KEY** to highlight on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON (except for Depth Areas Limits and Bathymetrics and Soundings Range).**

Bathymetric Lines

The Marine Settings menu under Map Configuration allows you to turn bathymetric lines ON and OFF, and to adjust the depth areas limit.

Bathymetric lines are taken from nautical charts and represent depth contours. To turn them ON/OFF, press **Aux**, select Map Configuration and press **ENTER**. Highlight Marine Settings and press **ENTER**. Highlight bathymetric lines and press **ENTER**. Choose ON or OFF and press **ENTER**. When you turn off bathymetric lines and return to the map, you will notice that some contours disappear and others ap-

pear in a paler shade of grey. Those that disappear are contours which appear on the chart as discontinuous or "open." Those contours that remain, displayed in lighter grey, are closed contours, (i.e. forming a closed shape). Closed-contour lines cannot be turned off.

Depth Areas Limits

Areas within closed depth contours are called depth areas. Depth areas can be shaded using the Depth Areas Limits setting under Map Configuration, Marine Settings. This shading gives you an instant visual cue on the chart when you approach the depth areas limit you have selected. When you set a depth area limit to a certain value, all areas *shallower* than this value will be shaded. Depth areas *deeper* than the selected value will remain unshaded.

The exact value you set as the Depth Area Limit may not be on a contour, as contours occur at varying intervals. Consequently, when you choose a depth value, the receiver defaults to the next *deepest* depth area limit available. For example, if the value you enter is 15 feet, and the adjacent closed depth contours are at 10 and 20 feet, the receiver defaults to 20 feet such that all area within this contour, (i.e. shallower than 20 feet), is shaded.

To set the Depth Areas Limits, press **Aux**, select Map Configuration and press **ENTER**. Highlight Marine Settings and press **ENTER**. Highlight Depths Areas Limits and press **EN-**

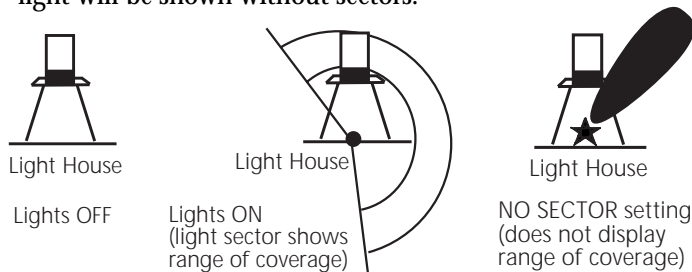**TER**. Use the **CURSOR KEY** to adjust the numerical value and press **ENTER**.

Bathymetrics and Soundings Range

You can enter a depth range under Bathymetrics and Soundings Range for displaying spot soundings and depth contour labels. All depth soundings within the selected range will be displayed on the map as a numerical value.

All bathymetric lines within the selected range will be darkened and labeled with the corresponding depth values.

In order to see bathymetric line labels, Bathymetric Lines must be turned on.
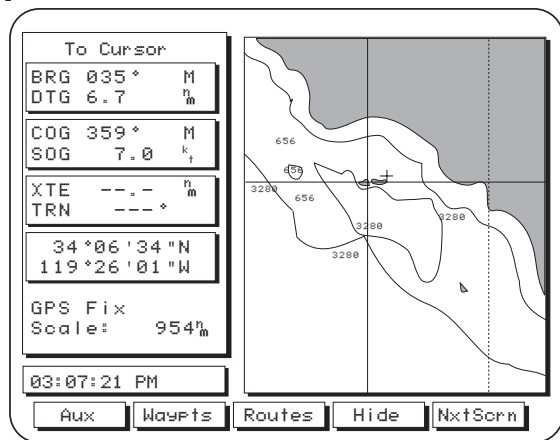
Turning Nav-Aid Settings On and Off

Nav-Aid icons shown on the map can be turned on and off. They include Ports and Services; Attention Areas, such as caution, danger and restricted areas, and offshore installations; Tracks and Routes; Lights; Buoys and Beacons; Signals, such as radar, radio, and electronic positioning systems; and Cartographic Objects, such as generic lines, areas and texts.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Map Configuration Functions and press **ENTER**.

Use the **CURSOR KEY** to highlight Nav-Aids and Features Menu and press **ENTER**.

Use the **CURSOR KEY** to select the feature you wish to activate or deactivate and press **ENTER**.

Use the **CURSOR KEY** to highlight on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON (except for Attention Areas, default: Contour; Lights, default: No Sector).**

Lights

When Lights are turned ON under the Nav-Aids and Features Menu, lights will be shown on lighthouses and other lights that rotate, a light sector will be displayed to show the range of coverage for the light. In the No Sector setting, the light will be shown without sectors.

Light House

Lights OFF

Light House

Lights ON
(light sector shows range of coverage)

Light House

NO SECTOR setting
(does not display range of coverage)

Turning Other Settings On and Off

Other settings on the map can be turned on and off. They include Names of continents, countries and cities; Compass, showing magnetic variation information points; Chart Generation, showing chart generation and nautical publication information; Complex Object Icons which can be set to *single* (individual icons for each object are superimposed on each other) or *multiple* (one icon represents multiple objects in the same location); and Info Level. (Amount of information given for each Nav-Aid or cartographic object; can be basic or detailed).

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Map Configuration Functions and press **ENTER**. Use the **CURSOR KEY** to highlight Other Settings Menu and press **ENTER**.

```
    Other Settings Menu
Names                    ON
Compass                  ON
Chart Generation         ON
New Objects              ON
Complex Object Icon Multiple
Info. Level         Detailed
```

Use the **CURSOR KEY** to select the feature you wish to activate or deactivate and press **ENTER**.

Use the **CURSOR KEY** to highlight on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON (except for Complex Object Icon, default: Multiple; Info. Level, default: Detailed).**

Turning Chart Settings On and Off

Chart related settings can be set to ON, OFF or AUTO. In the AUTO setting, if the scale is high, only the largest chart boundaries appear in order to avoid unnecessary clutter on the screen.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Map Configuration Functions and press **ENTER**. Use the **CURSOR KEY** to highlight Chart Settings Menu and press **ENTER**.

Use the **CURSOR KEY** to select the feature you wish to activate or deactivate and press **ENTER**.

```
   Chart Settings
Lat/Lon Grid       ON
Chart Boundaries   ON
Waypoint Icons     ON
Track Display      ON
Plotter Mode       OFF
```

Use the **CURSOR KEY** to highlight on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON (except Plotter Mode, default: OFF).**

Plotter Mode

Plotter Mode setting can be turned ON and OFF under the Chart Settings option within Map Configuration.

With Plotter Mode ON, the unit will allow you to zoom *closer* than the lowest available scale in the cartridge and enter "Track Plot Mode." If, on the other hand, the Plotter Mode setting is turned OFF, you cannot zoom any closer than the lowest available scale in the cartridge.

 When you zoom into or near the lowest scale available in the cartridge and Plotter Mode is OFF, as the cursor pans over the map, you will notice that the plotter zooms out automatically when you reach an area not covered by the detailed cartography on the C-card. This feature is designed to keep cartography displayed in the background even if you "run off the edge." Panning into an area not covered by the C-card causes the unit to zoom out to the lowest scale for which a chart is available.

When Plotter Mode setting is ON, this automatic zoom-out does not occur and the unit instead enters Track Plot Mode.

Track History Functions

The Track History Function allows plotting the track of the vessel as it moves. How often the boat's position is plotted on the map can be based on distance traveled or time passed.

```
Track History        ON
Plotting Interval    Distance
Resolution by Dist.  0.1 Nm
Resolution by Time   10 sec
Track Memory Used    001%

Clear Track Memory
```

A total of 2000 track points can be stored, and the percentage of these points used is shown as a percentage under Track Memory Used. When the track memory is filled up, newly recorded points require the unit to automatically erase points that were first recorded.

Setting Track History on or off will automatically set track display under Map Configuration - Chart Settings on or off, respectively.

Turning Track History On or Off

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**. Use the **CURSOR KEY** to highlight Track History and press **ENTER**.

Use the **CURSOR KEY** to turn Track History on or off and press **ENTER**. Press **ESC** to exit.

Default setting: **ON**

Choosing Plotting Interval

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**. Use the **CURSOR KEY** to highlight Plotting Interval and press **ENTER**.

Use the **CURSOR KEY** to select Distance or Time and press **ENTER**. Press **ESC** to exit.

Default setting: **Distance**

Resolution by Dist

If the plotting interval is based on distance, the user can select the distance resolution.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**.

Use the **CURSOR KEY** to highlight Resolution by Dist. and press **ENTER**.

Use the **CURSOR KEY** to select desired distance resolution and press **ENTER**. Press **ESC** to exit.

Default setting: **0.1 distance units**
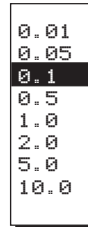
Resolution by Time

If the plotting interval is based on time, the user can select the time resolution.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**. Use the **CURSOR KEY** to highlight Resolution by Time and press **ENTER**.
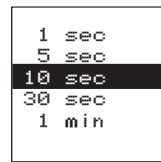
Use the **CURSOR KEY** to select 1 sec., 5 sec., 10 sec., 30 sec., or 1.0 minute for desired time resolution and press **ENTER**. Press **ESC** to exit.

Default setting: **10 sec**

Percentage of Track Memory Used

This shows what percentage of track memory is used up.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**.

Clearing Track Memory

Clearing track memory removes the track stored in memory that is plotted on the map. To clear track:

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Track History and press **ENTER**. Use the **CURSOR KEY** to highlight Clear Track Memory and press **ENTER**.

Use the **CURSOR KEY** to select Yes or No and press **ENTER**. Press **ESC** to exit.

Trip Planning Function

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Trip Planning and press **ENTER**.

The Trip Planning screen appears showing the route number, SOG, Fuel Flow, Departure date and time of the route displayed.

Use the **CURSOR KEY** to highlight one of the fields and press **ENTER**. Use the **CURSOR KEY** to edit and press **ENTER** to confirm.

The softkeys allow you to view the next route, the previous route, the totals for the route (total for Distance, Fuel, ETE and ETA) and to scroll page up and page down in the route currently displayed. Press **ESC** to exit.
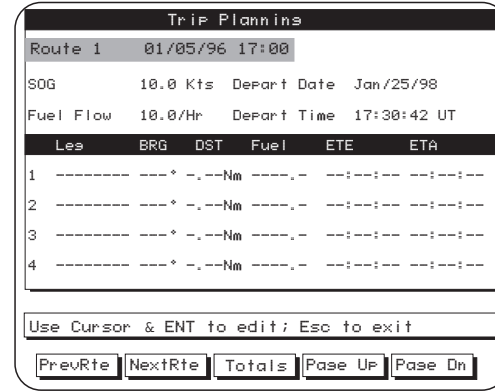
Calculator

The receiver allows you to view sunrise/sunset and lunar phase information for a specfic position and date.

Actual current (set and drift) can be computed using the speed and compass heading input from a boat's sensors or by entering them manually.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Calculator and press **ENTER**.

Calculating Sunrise/Sunset and Lunar Information

Use the **CURSOR KEY** to highlight Sunrise/Sunset Lunar and press **ENTER**.

Highlight Location and press **ENTER** to access the Find Waypoint function which allows you to enter the name of a waypoint.

Use the **CURSOR KEY** to change the location if desired. Press **ENTER** to confirm.

> When the unit is first turned on, the default setting for location is POS which is the last computed position, however, the field does not return to this value unless the unit is turned off.

Use the **CURSOR KEY** to highlight Date and press **ENTER** to display the date window.

Use the **CURSOR KEY** to change the date to something other than the present date, if desired, and press **ENTER**.

Once the date is selected, the sunrise/sunset times and lunar phase information are recalculated and displayed.

Press **ESC**.

Calculating Actual Current

Use the **CURSOR KEY** to access the Actual Current window and press **ENTER**.

If your receiver is not connected to an external instrument (i.e. External Instrument is off), the highlight moves to the Speed Log field.

Press **ENTER** to display the Speed Log window.

Use the **CURSOR KEY** to change the speed and press **ENTER**.

Highlight Heading and press **ENTER** to display the Heading window.

Use the **CURSOR KEY** to change the heading value and press **ENTER**.

The Current Speed (Drift) and Current Direction (Set) are recalculated and displayed.

> External Instrument is automatically turned ON when NMEA input is selected in Data Port Setup. In this case the Speed Log and Heading cannot be changed manually since they are received as input.

The receiver accepts the VHW (log speed and compass heading), VBW (log speed), HDM (magnetic compass heading), HDT (true heading reading) and HDG (magnetic compass

heading) NMEA 0183. Different combinations of these sentences could be output by the boat's sensors. The data format of the sentences is given in the Appendix.

Simulation Mode Function

The unit can simulate traveling on a one-leg route at a certain speed and heading defined by the user. Therefore, in order to set the unit in the simulation mode, two or more waypoints must already be stored in memory in order for a one-leg route to be created.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Simulation Mode and press **ENTER**. Use the **CURSOR KEY** to highlight Speed and press **ENTER**. Use the

```
Speed               1.0 Kts
Heading             000° M
Starting Waypoint   --------
Dest. Waypoint      --------

Activate Simulation  OFF
```

CURSOR KEY to set speed value and press **ENTER**. Then set the heading value, starting and ending waypoints. Use the **CURSOR KEY** to highlight Activate Simulation and press **ENTER**. Highlight On and press **ENTER**. Press **ESC** to exit.

To deactivate simulation mode, simply set Activate Simulation to Off.

Memory Reset

Two options are available under Memory Reset: Total Memory Reset and GPS Reset Only.

Total Memory Reset is used only if you wish to erase the last completed position, time, date and all user-entered information, including all waypoints, routes, track and setup. When Total Memory Reset is executed, the auxiliary functions are reset to their default values.

GPS Reset clears only the last computed position, time and date. All other memory remains intact.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Memory Reset and press **ENTER**. Use the **CURSOR KEY** to highlight Total Memory Reset or GPS Reset Only and press **ENTER**.

A confirmation screen appears. Highlight YES and press **ENTER** and the unit will turn off after a few seconds. Turn the unit on again to continue.

Color Setup

Two options are available under Color Setup: Waypoint Color and Track Color. You may choose the color of Waypoints and Tracks.

Press the **Aux** softkey, use the **CURSOR KEY** to highlight Color Setup and press **ENTER**. Use the **CURSOR KEY**

to highlight Waypoint Color or Track Color and press **ENTER**. Use the cursor to select the color you prefer and press **ENTER**.

User C-Card

The User C-Card allows storing and retrieving of waypoints, routes and track history. A C-Card must be installed into one of the two of the receiver's slots to be able to access this functionality (for more information on cartridge installation, see *Data Cartridges* section).

💡 The information on a User C-Card is interchangeable and can be accessed by another NAV 6500/NAV 6510.

Once the C-Card is installed, you can access the User C-Card functions. To access these softkeys, press the **Aux** softkey, use the **CURSOR KEY** to highlight User C-Card and press **ENTER**.

The softkeys display Save, Load, Delete, Sort By and Slot. The **Save** softkey saves your waypoints, and associated routes or tracks that are in the receiver's memory. The **Load** softkey inputs the data on the C-Card back into the receiver's memory. The **Delete** softkey erases the file you have highlighted. The **Sort By** softkey allows you to sort by name, time and date, and type. The **Slot** softkey allows you to read the inserted C-Card, switch the slot or format the C-Card, as shown by the softkeys that appear once the **Slot** softkey has been selected.

Name	Date	Time	Type	Slot 2
FILE05	OCT/12/98	20:52:03	Waypts	
FILE01	MAY/13/98	08:40:35	Routes	
FILE10	FEB/03/98	01:15:10	Tracks	

Sort By:
Name

In Memory
Waypoints:002
Routes: 005
Tracks: 000%

Files: 009

READING DIR
..OK

Select using Cursor ESC; to exit.

| Save | Load | Delete | Sort By | Slot |

To save, press the **Save** softkey. The softkeys will change to **Waypts** and **Tracks**. Make your selection. An information window appears asking you to select the file you want to save. Use the **CURSOR KEY** to input the name and press **ENTER**.

💡 You have a maximum of 8 characters to use in creating a file name. The characters may be either letters, numbers or a combination of both.

To load, press the **Load** softkey to copy to the receiver. The screen on the bottom right corner will read "Loading". When complete, "..OK" appears. This will replace all waypoints and associated routes or tracks within memory.

To delete, use the **CURSOR KEY** to highlight what you want to delete and press the **Delete** softkey. A confirmation screen appears. Highlight **YES** or **NO** and press **ENTER**.

To sort, press the **Sort By** softkey. The softkeys change to **Name**, **Time** and **Type**. The **Time** softkey sorts by date and time of the file creation.

To access slot, press the **Slot** softkey. The softkeys change to **Read**, **Switch** and **Format**. If there is no C-Card inserted, an information window appears stating there is no C-Card present.

When the **Read** softkey is pressed, the receiver displays the information on the C-Card it is reading. The screen on the right of the screen will read, "Reading Dir". When "..OK" appears, the reading is complete.

You can tell the receiver which of the slots you want it to read from (For more information on cartridge installation, see the *Data Cartridges* section).

To switch the Slot, press the **Switch** softkey. This tells the receiver to access the slot that you have chosen, either Slot 1 or Slot 2. If there is no C-Card in the specified slot, an information window will appear saying "C-Card Not Found". If there is a C-Card, the data on the C-Card will appear on the screen. The small screen in the upper right will indicate which slot you are using, Slot 1 or Slot 2.

To prepare the C-Card for receiving and storing information, press the **Format** softkey. A confirmation screen appears. Highlight **YES** and press **ENTER**.

The C-Card needs to be inserted into the receiver in order to obtain the information.

Map Shift

The position plotted on the map screen and the electronic charts on the C-Map cartridges are based on WGS 1984 datum regardless of the datum set. Paper charts from which electronic charts are created may be based on other datums and were shifted to WGS 1984 when the electronic charts were created. In some rare cases, the datum of the paper chart is unknown, which may cause a consistent bias (error) to appear between the displayed position and known coordinates. This bias can be corrected by using Map Shft to shift the receiver's computed position to match its coordinates on your paper chart.

When using Map Shft, we recommend that you physically go to a position that is clearly recognizable on the paper chart, to serve as a basis for performing the shift.

From any NAV screen, press **Nxt Scrn** until you are viewing the Sat Status screen.

When the unit is computing position fixes, from the Sat Status screen press the **Map Shft** softkey.

The Map Screen appears. When no Map Shft has been set, the help bar indicates "No map shift set; press ENT to set."

Travel to a position you recognize with certainty on your paper chart and use the **ZOOM IN** key to select a scale level that closely matches the paper chart's scale. Compare this position on the paper chart with the boat position displayed on the receiver. The receiver's boat icon may appear to be far from your current position on the paper chart.

To set the bias, use the **CURSOR KEY** to move the cursor, active at your current GPS position, to the position corresponding to your current location on the paper chart. A dotted line is traced from your current position to the cursor. When you have finished placing the cursor, press **ENTER**.

As you travel, you can check to see that you have shifted the boat's position properly by comparing other points of reference on your paper chart with the corresponding points on the electronic chart.

The following is a brief guide to some of the problems that might be encountered while using the Magellan NAV 6500/ NAV 6510 and what you can do to correct them.

Receiver will not turn on

1 The receiver may not have been hooked up correctly to external power, or the external power source is not working. Check the connections, and be sure the external power source is working. The power supply used or the circuit breaker that the unit is connected to should be rated for at least 0.5A at 12V for the NAV 6500 or 1.0A at 12V for the NAV 6510.

Use only the Magellan Power/Data Cable to connect the receiver to external power.

2 Press power key.

Receiver will not compute a position fix

1 Make sure that the antenna has a clear and unobstructed view of the sky.

2 Check the antenna connections. Make sure the coaxial cable is firmly secured to the back of the unit. Check along the length of the cable to make sure it is not cut. With a voltmeter, you may also measure the voltage output from the unit to the antenna, which should be 5 ± 0.25 VDC between the center conductor and the shield of the TNC connector. (You need to measure across a 100ohm resistor for correct reading.)

3 Have you moved more than 300 miles with the receiver off since your last position fix? If so, the receiver may need to be reinitialized.

4 Check UTC date and time. If it is wrong, re-enter it under Aux-General Setup.

5 If the receiver status on any of the NAV screens is "No GPS," turn the unit off and on.

6 If none of the above works, do a GPS reset. Select Memory Reset under Aux and execute the "GPS Reset Only."

Frozen display, keypad does not respond

1 Disconnect power and wait for the receiver to turn off. Reconnect power, turn power back on.

Position coordinates on your receiver do not match the location on your map.

1 Make sure that your receiver is set up to use the same datum as your map. The map datum is generally shown in the map legend. See Map Datum under Navigation Setup for instructions on selecting the map datum in your receiver.

Position fix fluctuates

1 Small changes in the position coordinates and elevation are normal. They are caused by several variables, including the geometric quality of the fix and the effects of SA. Geometric quality is a measurement of the probable accuracy of a fix based on the position of the satellites being used in relation to each other.

Unit does not recognize C-card installed

1 Make sure the C-card is mounted all the way into the C-card slot so it is locked in place.

2 Check the C-card contacts to make sure they are clean. If dirt is collected on the gold contacts, use a soft dry cloth to wipe the dirt away.

If you are experiencing a problem that is not described above, please contact Magellan Technical Support for assistance at Tel.: (909) 394-5000 or Fax: (909) 394-7050. Technical Support engineers are available from 8 a.m. to 5 p.m. PST.

If none of the above fixes the problem, as a last resort, you may attempt Total Memory Reset to clear the unit's memory, including waypoints, routes and GPS initialization information. Total Memory Reset can be done under Aux-Memory Reset or if the problem is such that you can't access the Aux functions follow this procedure.

With the unit off, press and hold any key and press the **PWR** key simultaneously to turn on the unit. Highlight RAM using the **Cursor Key** and press **ENT**. Press **ENT** again to clear RAM. Turn off the unit.

```
Fix alarm

Unit is no
longer computing
position fix

Press ENT
```

This message appears when position fix is more than 20 seconds old. The alarm will sound when the message appears.

```
Arrival alarm

Closer than x.xx
nm to WPT 006

Press ENT
```

Is displayed when Arrival Radius is set and the boat has moved within the arrival radius.

```
Anchor alarm

Boat has moved
x.xx nm from
anchor spot

Press ENT
```

Is displayed when anchor alarm is on and boat moved more than X.XX from position fix when the alarm was set on. The alarm sounds when message appears.

```
XTE alarm

Off course by
more than x.xx

Press ENT
```

Is displayed when XTE alarm is on and the boat is more than X.XX Nm from the course line.

Tutorial

This section will walk you through creating waypoints, creating a route, editing the route, and, finally, activating the route you created. The area chosen for this example was intentionally selected so that there is little or no land mass to interfere with the tutorial. You may follow along with your receiver, just bear in mind that coordinate values displayed in this tutorial may differ from the ones you view on your receiver.

Some of the steps and features displayed can be performed in other manners. For example, in this tutorial, a waypoint could have been created using the MARK key or created from the waypoint list. The objective here is to demonstrate the creation of waypoints and routes using the Map Screen.

The first step is to look at the Map Screen we are going to use. The receiver has been turned on and the `NxtScrn` softkey pressed, causing the Map Screen to be displayed. Next, the `Hide` softkey is pressed to allow a larger area of the map to be displayed. The cursor is moved with the **Cursor Key** until the area in which the route is to be created is displayed.

40 00 00.00

30 00 00.00
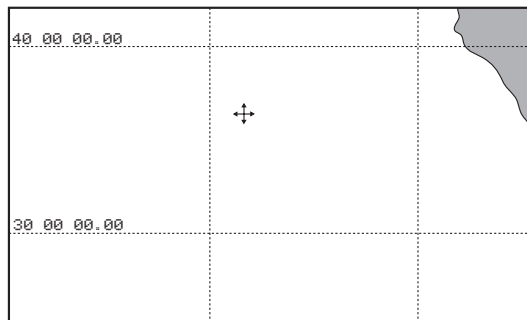
Press `Waypts` to access the waypoints map screen. Use the **CURSOR KEY** to move the cursor (arrow) to the location of a waypoint that will be used in the route.
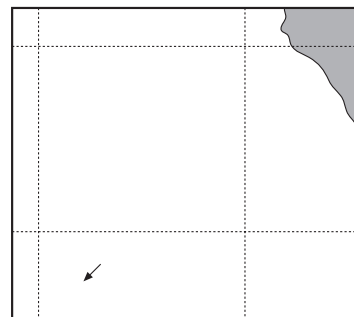
Press the `Create` softkey.

A Create Waypoints window is displayed. From this window you can change the name, type, coordinates, and description for this waypoint. For this example, the information is acceptable. Press ⬚Done⬚.


```
Create Waypoint: Cursor
Name: WPT001    Type: ●
       29°23.76 N
      138°43.74 W
Description: 01/25/96 18:17
```


WPT001
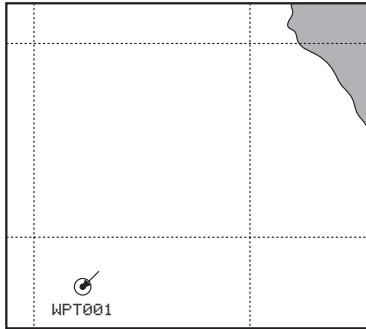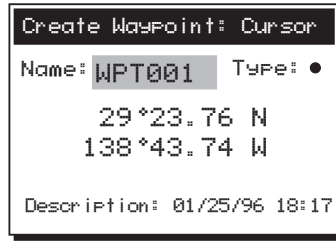
The map now resembles the one to the left with the new waypoint and name displayed. The circle around the waypoint indicates that the cursor is pointing to the waypoint and that the waypoint can be edited by pressing the **ENTER** key.

The next step is to create a second waypoint. This is done just as before; move the cursor to the desired position, press ⬚Create⬚, and accept the waypoint values from the Create Waypoint window by pressing ⬚Done⬚. Press the **ESC** key. The display returns to the Map screen with the two newly created waypoints displayed.
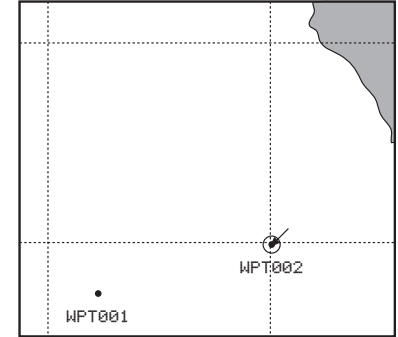
WPT002
WPT001


```
40 00 00.00

30 00 00.00
                              WPT002
         WPT001
```
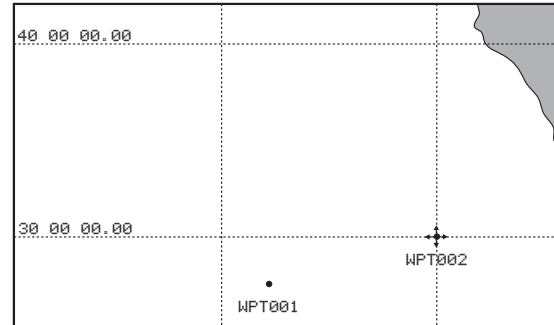
Press the Routes softkey. This screen looks just like the waypoint screen but the softkeys are different. This is the starting point for creating a route.
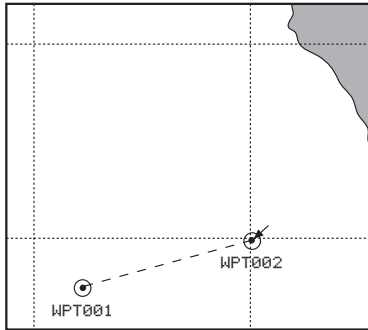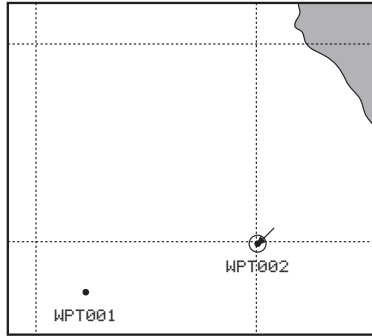
The first step in creating the route will be to define the starting location for the route. Press Create. Move the cursor to WPT001, as this will be the starting waypoint for the route. Press ENTER. Move the cursor towards waypoint WPT002. Notice the dashed line from WPT001 to the cursor. This helps you visualize the leg you are creating.

When the cursor is over WPT002, press ENTER. This defines WPT002 as the destination for the leg being created. The dashed line becomes solid, and as the cursor is moved away from WPT002, a new dashed line is drawn.
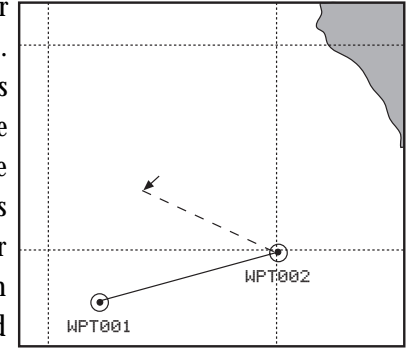
Move the cursor to the new desired destination point. In this example there is no predefined waypoint at the position we want to use in the route. Press ENTER. The receiver provides the means to create a waypoint at this point automatically. To do this, a Create Waypoint (identical to the window displayed earlier) appears. The only difference is that the coordinates cannot be changed from this window.

Press Done.

Create Waypoint

Name: WPT003   Type: ●

32°50.94 N
135°14.57 W

Description: 01/25/96 18:47
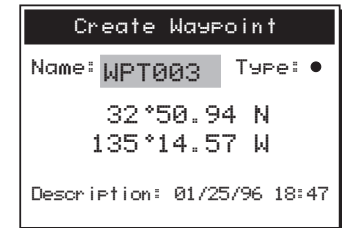
The dashed line has become a solid line. From this point, more legs could be added (appended) to the route in the same way. In this example, we have created a two-leg route. Press `Done` to complete the Create Route function.
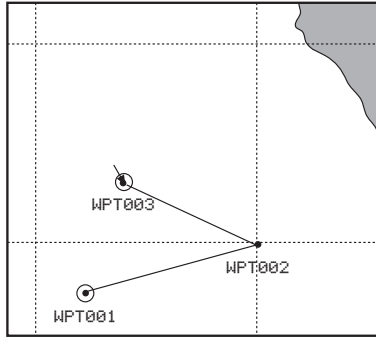
When you have moved the cursor to the new waypoint position, press `ENTER`. The waypoint has been moved and the route recalculated.
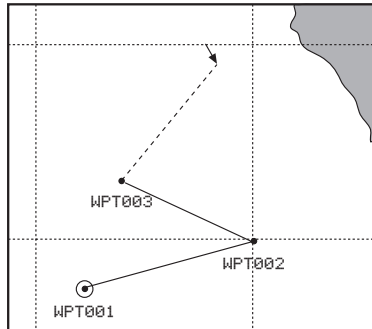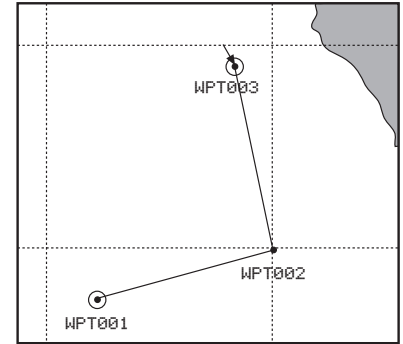
Moving a Waypoint. We will now move WPT003 to a new location. Press `Edit` to access the Route Edit mode. Move the cursor towards WPT003 and when the circle appears around the waypoint, press `Move`. As you move the cursor away from WPT003, a dashed line aids you in placing it.

Inserting a Waypoint. A waypoint can be inserted in a route. To accomplish this, move the cursor until it is close to the leg where the new waypoint will be inserted. The **Insert** softkey becomes active.
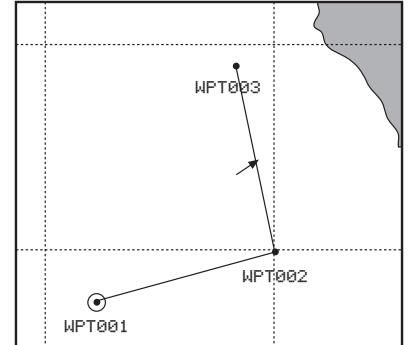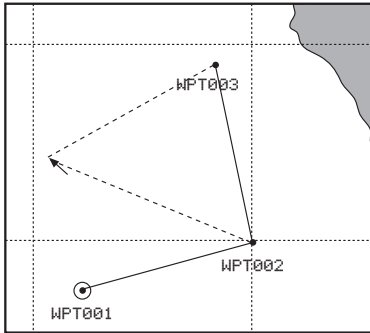
Press `Insert`. As you begin moving the cursor, two dashed lines are displayed showing how the route is being changed.

Pressing `Done` accepts the new waypoint and the route now resembles the one at the right.

When you are satisfied with the location of the cursor, press **ENTER**. If there is an existing waypoint at that position, it will be used in the route, if not, the Insert Waypoint window will be displayed. This win-


```
Insert Waypoint
Name: WPT004    Type: ●
       34°49.75 N
      139°05.76 W
Description: 01/25/96 19:00
```

dow behaves like the other Creating Waypoint windows presented in this tutorial. However, as in the previous example, the coordinates cannot be changed.

Removing a Waypoint. Another common editing function is removing a waypoint from a route. Move the cursor to the waypoint to be removed from the route. (*Please note that the waypoint is not removed from the receiver's memory, but only from this route.*)
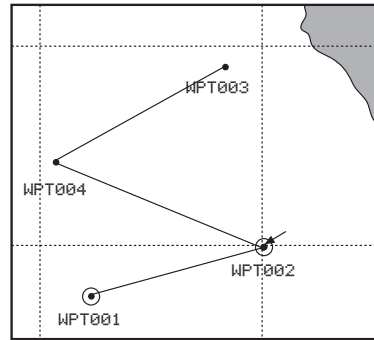
Press Remove . WPT002 is removed from the route but is still displayed on the screen. The route has been reconfigured, starting at WPT001, to WPT004, and ending at WPT003.
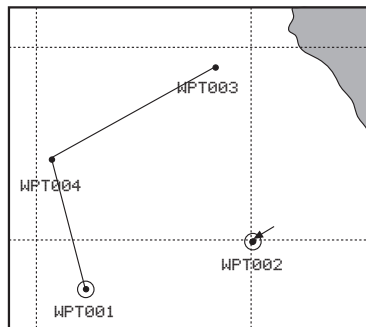
Activating a Route. A route can be activated from the route list.

From any root screen press the **Routes**, **List** softkeys. The route list appears, containing up to twenty-five routes you have created. Use the **CURSOR KEY** to scroll to additional pages, if any.

Highlight the route you wish to activate and press the **Activte** softkey.

Only one route can be activated at a time. Activating a route automatically deactivates the previous active route.

An arrow appears next to the number of the activated route in the list, and a window appears briefly: "Route x is the active route." The display returns to the route map screen, showing the activated route.

Deactivating a Route. An activated route can be deactivated from the route list.

From any root screen press the **Routes**, **List** softkeys.

The activated route is shown by an arrow next to the route number in the list. Use the **CURSOR KEY** to highlight the route to be deactivated, and press the **Deactiv** softkey.

The arrow next to the route number in the list disappears. The selected route has been deactivated. When you return to the map screen, the deactivated route is no longer shown.

NAV 6500/NAV 6510 Appendix

Installation Instructions

Before you use the receiver, both the external antenna and the unit must be mounted. The unit must also be connected to its power source, to any NMEA device you want to support and/or to a differential beacon receiver. The unit can also be connected to an external alarm.

Before installing the receiver, whether using the Gimbal mount or the flush-mount, there are several things you should keep in mind.

The receiver should be mounted in a location where it is easily viewed, where the operating keys are accessible and where there is sufficient clearance to insert and remove cartridges. You will need at least 2 inches clearance at the bottom front of the unit for access to the cartridges.

Although the receiver is splash proof, it should not be subjected to prolonged exposure to water. To protect the unit from direct sunlight and water, the cover (supplied with the unit) should be used when the unit is not being operated.

We do not recommend installing the receiver within 1 foot (0.3 meters) of a magnetic compass or a flux gate sensor. (Autopilots and remote electronic compasses typically have flux gate sensors).

Gimbal Mount Installation Instructions

For gimbal mounting the unit, find a surface that is fairly flat for the base plate. You will need four screws (not included) for mounting the base plate on the selected surface.

Steps 1 through 4 are done at the factory, but are provided here in case you take the gimbal mount apart and need to put it back together.

1) Place the metal coil in the opening on the under side of the base plate.
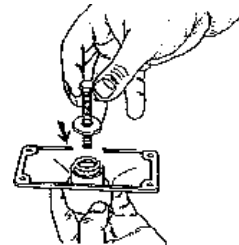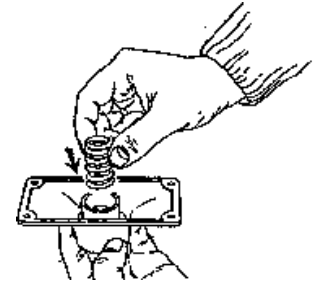
2) Slip the bolt through the plastic washer, then in through the coil and out the top side of the base plate.

3) Fit the threaded adapter onto the exposed end of the bolt and screw in the bolt. Make sure to adjust the direction of the adapter, by aligning the teeth as desired, before tightening.
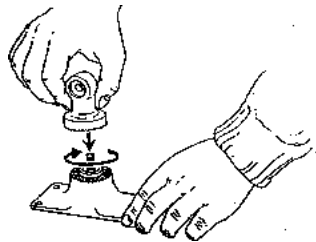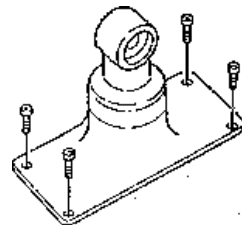
4) Use a wrench to tighten the bolt so that it does not protrude beyond the perimeter of the base plate.
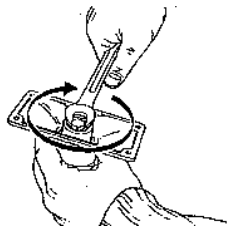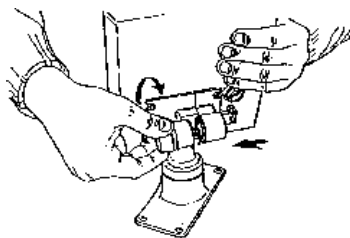
5) Verify that the bolt is level with or inside the perimeter of the base plate. (Otherwise, the base will not rest flat on the surface to which you are attaching it.)
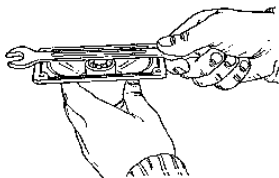
6) Insert four screws as shown to attach the base plate to the desired surface.

7) Attach the threaded mount on the back of the receiver using three screws supplied with the unit. (*Not shown*).

8) Fit the threaded mount on the back of the receiver onto the threaded bolt adapter you have just assembled.

9) Adjust the viewing angle of the display, then tighten the bolt through the threaded mount until the teeth are interlocking and the receiver is secured.
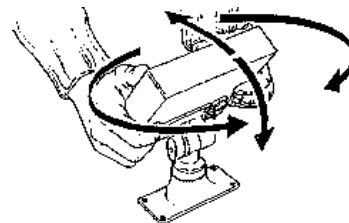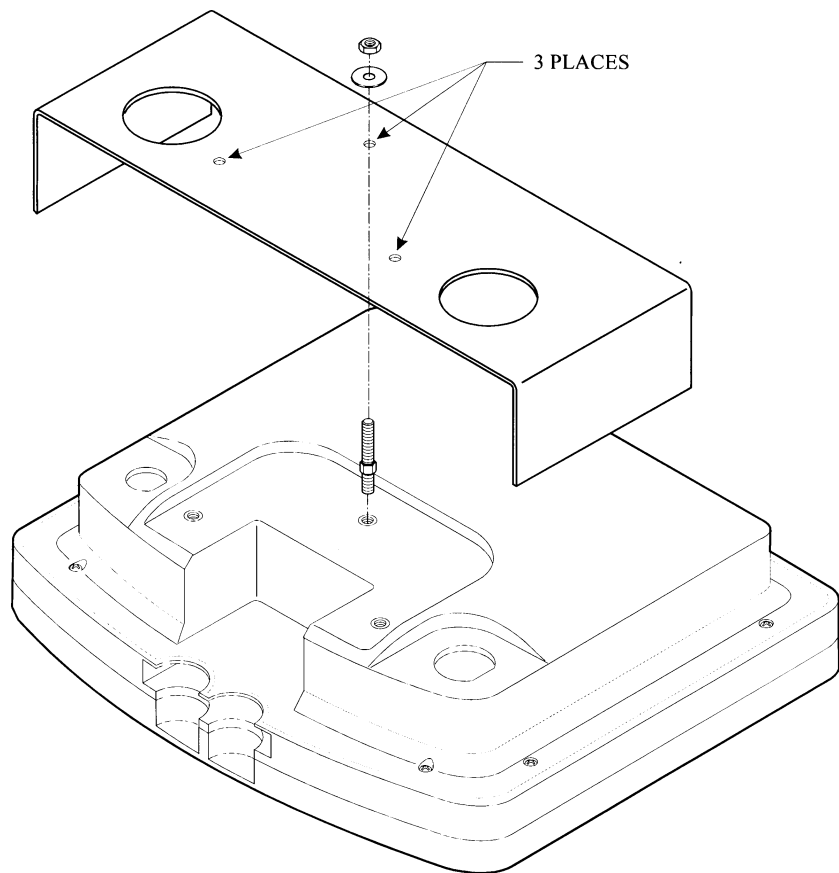
Flush Mount Installation Instructions

1) When deciding on a location to flush mount the unit, find a location so the unit can be viewed clearly. Remember that the unit, once flush mounted, cannot be turned or tilted.

2) Use the flush mount template provided and cut out the portion of the wall through which the unit will mount. (You may need to reuse the template, so do not discard it.)

3) Insert the three threaded studs on the back of the unit. If the threaded mount used for Gimbal mount is attached, you will need to detach it in order to insert the three studs.

4) Pass the power/data and antenna cables through the flush mount bracket and connect them to the unit.

5) Fit the unit through the cut out and adjust the flush mount bracket and connect them to the unit.

6) Insert the three washers on the threaded studs. Then insert the three nuts on the studs and tighten them so that thereceiver unit is firmly mounted.

3 PLACES

Flush Mount Diagram

Proper Antenna Installation - Signal Reception

The illustrations show both the proper and improper placement of a fixed antenna on a boat. Physical obstructions (buildings, large trees, mountains, etc.) will block satellite signals from reaching the receiver. If the unit is unable to get a position fix, move the receiver antenna so it has a clearer view of the sky, allowing it to choose from all of the satellites currently available.
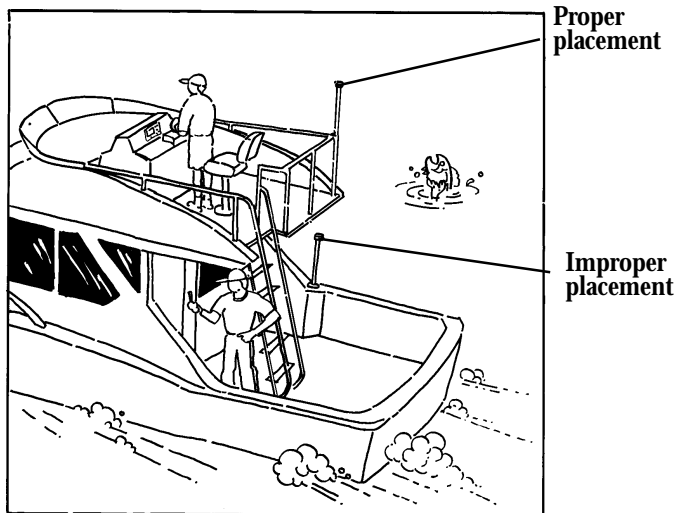
For an illustration of the antenna mounting, see the mounting instruction sheet included with the antenna package.

Electrical Connections

Use the power/data cable to connect the unit to a power source and to data devices.

The receiver accepts 10-35 VDC. It is recommend, but not required, for a fuse (3A slow blow) to be connected to the positive lead of the power source. See the wiring diagram to make the necessary connections.

The power/data connector on the back of the unit has the following pin-out.
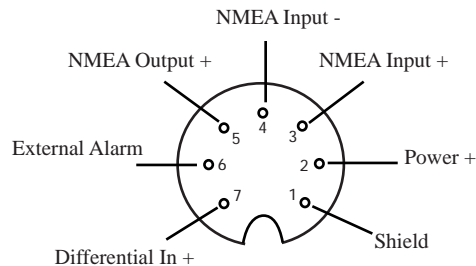
Wiring Instructions

Power/Data Cable

Connection Matrix		
Connect...	**Wire**	
	(+)	**(−)**
DBR	Brown	Black*
External Alarm **	Red	Yellow
NMEA Data to NAV 6500/6510	White	Green
NMEA Data from NAV 6500/6510	Gray	Black*
External Power	Red***	Black*

*   If connecting to more than one device, additional wire must be spliced to the black wire.

** You may prefer to connect the alarm to a separate power supply.

*** It is recommended that a 3-amp, in-line fuse be used on the positive lead to the external power.

Plot Presentation symbols include the following new icons.

Areas, limits
Cargo transhipment area; Contiguous zone; Continental shelf area; Custom zone; Dumping ground; Exclusive economic zone; Fishery zone; Fishing ground; Free port area; Harbour area (administrative); Incineration area; Log pond; Military practice area; National territorial area; Restricted area; Sea area; Sea-plane landing area; Spoil ground; Straight territorial sea baseline; Submarine translit lane; Territorial sea area; no data area.

Airport area
Airport area.

Anchorage area/Anchor

Anchor berth

Beacon
Lattice

Generic

Tower

Withy

Beacon, cardinal; Beacon, isolated danger; Beacon, safe water; Beacon, special purpose; Beacon, generic

Bottom type
Seabed area.

Building, religious

Building, single

Buoys
Barrel

Can, cyclindrical

Conical

Pillar

Spar, Spindle

Spherical

Super

Buoys, cardinal; Buoy, installation; Buoy, isolated danger; Buoy, internal; Buoy, safe water; Buoy, special purpose; Buoy, generic

Cairn

Cartographic objects
Closing line; Cartographic symbol; Cartographic line; Cartographic area; TEXT; Line, generic Text; Area, generic; National Character Set Text; Incomplete survey area.

Caution Areas

Cemetery

Chimney

Coastguard station

Compass

Compass, Distance
Local magnetic anomaly.

Composite objects
Airport; Anchorage; Channel edge; Deep water route; Defined water; Harbour; Range system; Lighthouse; Mooring trot; Navigation mark, afloat; Navigation mark, fixed; Traffic Separation Scheme System.

Control point

Crane

Cultural Dashed
Cable, overhead; Fence; Pipeline, overhead; Pylon; Telepheric, Tunnel entrance.

Cultural Features
Bridge; Built-up area; Railway; Road crossing; Road part; Runway; Sloping ground; Square.

Depths 1 (Shallow)
Depth area; Depth contour.

Depths 1 (Medium)
Depth area; Depth contour.

Depths 1 (Deep)
Depth area; Depth contour.

Depths 2
Dredged area; Spot Soundings; Shallow water blue.

Depths 3
Intertidal area; Zero meter contour.

Dish aerial

Extended navigational

Flagstaff/Flagpole

Flare stack		**Marine farm/culture**		**Natural Features (ICE)** Ice area; Pingo.	

Flare stack

Fish haven

Fishing facility

Fog signal

Fortified structure

Lake

Landmarks
Tower.

Light

Light vessels

Light House

Marine farm/culture

Mast

(m) **Meta objects**
Accuracy of data; Compilation scale of data; Horizontal datum of data; Nautical publication information; Production information; Sounding datum of data; Survey reliability; Survey source; Units of measurement of data; Vertical datum of data.

Mooring/Warping facility

Monument

Natural Features
Coastline; Dune; Hill; Lake shore; Land area; Land elevation; Land region; Salt Pan; Slope Topline; Tree; Vegetation area.

Natural Features (ICE)
Ice area; Pingo.

Natural Features (RIVERS)
Canal; Canal bank; Rapids; River; River bank; Waterfall.

Navigational aid, generic

Navigational mark fixed

Navigational mark floating

Offshore Installation
Cable, submarine; Cable area; Diffuser; Obstruction; Offshore production area; Pipeline, submarine/on land; Pipeline area; Production installation.

Offshore platform

Pile

Ports
Berthing facility; Causeway; Checkpoint; Dam; Distance mark; Dock area; Dry dock; Dyke area; Dyke crown; Floating dock; Gate; Gridiron; Harbour facility; Hulk; Landing place; Landing stairs; Lock basin; Oil barrier; Pontoon; Ramp; Shoreline construction; Slipway; Weir; Small craft facility.

Production Objects
Correction marker.

Radar dome

Radar, Radio
Radar, Radio, Electronic Positioning System
Radar station; Radar transponder; Radio station_refco.

Radar Reflector

Rescue station

Rocks
Underwater rock.

Sand waves

Services
Pilot boarding place.

Signals
Chain/Wire; Top mark.

Signal Station
Signal station, traffic; Signal station, warning.

Silo

Spring

Tank

Tracks, Routes
Deep water route part; Deep water route centreline; Fairway; Ferry route; Navigation line; Precautionary area; radar line; Radar range; Radio calling-in point; Recommended route centreline; Recommended track; Recommended traffic lane part; Traffic separation scheme crossing; Traffic separation scheme lane part; Traffic separation scheme round about; Traffic separation zone; Two-way route part.

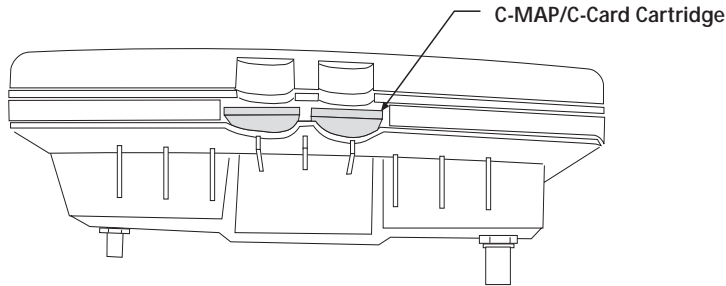|	
⊙	**Water Turbulence** Tideway; Water turbulence.
✑	**Weed/Kelp**
✗	**Windmill**
⊼	**Windmotor**
⊹	**Wrecks**

Data Cartridges

In addition to its internal chart information, the receiver displays detailed navigational chart information from external data cartridges.

Insert one or two cartridges in the slots located on the bottom of the unit, below the softkeys. Cartridges should be inserted or removed when the unit is powered off.

While facing the bottom of the receiver, hold the cartridge with the gold contacts toward the unit and "C-MAP" or "C-Card" facing up. Insert the cartridge into one of the slots at the bottom of the unit. Push the cartridge all the way in. When it will go no further, press the edge of the cartridge down gently until rests in place behind the plastic catch.

To remove the cartridge, turn the unit off and push the cartridge in and up gently to free it from the plastic catch, then remove. The cartridge will pop out easily.

Data cartridges are available from your Magellan dealer or directly from C-MAP.

C-MAP
133 Falmouth Road
Mashpee, MA 02649-9910
tel.   (508) 477-8010
fax   (508) 477-6168
         (800) 424-2627

C-MAP Italy
Via Caboto, 9
54036 Marina di Carrara
Italy
tel.   0585.630.703
fax   0585.631.282

C-MAP/C-Card Cartridge

NAV 6500/NAV 6510 — Bottom View

List of Available Datums

ADINDAN
AFGOOYE
AIN EL ABD 70
ANNA 1 AS. 65
ANTIGUA AS. 43
ARC 1950
ARC 1960
AS.BEACON 'E'
AS.DOS 71/4
AS.STATION 52
AS.TERN ISL.
ASCENS. ISL.58
AUS.GEOD. 66
AUS. GEOD. 84
AYABELLE
BELLEVUE (IGN)
BERMUDA 1967
BISSAU
BOGOTA OBS.
BUKIT RIMPAH
C. CANAVERAL
CAMP AREA AS.
CANTON AS. 66
CAPE
CARTHAGE
CHATHAM 1971
CHAU ASTRO
CMP.INCHAUSPE

CORR. ALEGRE
DABOLA
DJAKARTA
DOS 1968
EASTER ISL.67
EUROPEAN 1950
EUROPEAN 1979
F.THOMAS 1955
FINNISH (KKJ)
GAN 1970
GEODETIC 1949
GRACIOSA BASE
GUAM 1963
GUNUNG SEGARA
GUX 1 ASTRO
HERAT NORTH
HERMANSKOGE
HJORSEY 1955
HONG KONG 63
HU-TZU-SHAN
IGN 1954
IGN47
IGN47-51
IGN72
INDIAN
INDIAN 1954
INDIAN 1975
IRELAND 1965

ISTS 73 AS.69
ISTS AS. 1968
JOHNSTON 1961
KANDEWALA
KERGUELEN 1949
KERTAU 1948
KUSAIE AS. 51
L.C. 5 ASTRO
LEIGON
LIBERIA 1964
LISBOA
LUZON
M. MERCURY 68
MAHE 1971
MASSAWA
MERCHICH
MERCURY 1960
MIDWAY AS. 61
MINNA
MONTSERRAT 58
M'PORALOKO
NAD 1927
NAD 1983
NAHRWAN
NANKING 1960
NAPARIMA, BWI
NEW P. SANTO
NORWEGIAN

O.S. IRELAND
O.S.G.B. 1936
OBSERVAT.1996
OLD EGYPTIAN
OLD HAWAIIAN
OMAN
PTE. NOIRE
P.TO SANTO
PICO NIEVES
PITCAIRN 1967
POINT 58
POLISH
POTSDAM
PRV.S.AMER.56
PRV.S.CHIL.63
PUERTO RICO
PULKOVO 1942
QATAR NATION.
QORNOQ
REUNION
REV. KERTAU
REV. NAHRWAN
ROME 1940
S. AMERICAN 69
SANTO(DOS) 65
SAO BRAZ
SAPPER H. 43
SCHWARZECK

SELVAGEM 1938
SOUTH ASIA
SWEDISH
SWISS CH-1903
TANANARIVE 25
TIMBALAI 1948
TOKYO
TRISTAN 1968
VITI LEVU 16
VOIROL 1875
WAKE ISL.1952
WAKE-ENIWETOK
WGS 1972
WGS 1984
YACARE
ZANDERIJ

NMEA Messages

Your GPS receiver can be set to output GPS data in the NMEA 0183 version 1.5 or version 2.0 format to interface with other marine devices or equipment.

NMEA DATA MESSAGES. NMEA data is output at 4800 baud, 8, N, 1. These settings are acceptable to most equipment and software applications.

There are several NMEA output message sets, each with a slightly different application. Check documentation for your external equipment to choose the appropriate message set.

SET	OUTPUT/USAGE
0183A	BWC, APA, GLL, VTG
	Remote displays, version 1.5 marine autopilots
0183B	RMC, RMB
	NMEA-recommended navigation data for remote map, etc.
0183C	APA, GGA, BWC, GLL, VTG
	Vers. 1.5 marine autopilot data and satellite data
0183D	BWC, APB, GLL, VTG, GGA
	V 2.0 NMEA Interface
0183E	RMB, RMC
	V 2.0 NMEA Interface

NMEA Message Definitions

APA Autopilot cross track error, direction to steer, status of GPS, route status, destination waypoint name, and bearing from origin to destination (old format).

APB Revised autopilot message contains all of the above plus: heading to steer toward destination, bearing from the present position to the destination (magnetic or true).

BWC Range and bearing to a waypoint

GGA GPS position, time, fix quality, number of satellites used, HDOP (Horizontal Dilution of Precision), differential reference information, and age.

GLL GPS-derived latitude, longitude, and time of fix.

RMB Data status, cross track error, direction to steer, origin, destination waypoint, waypoint location, bearing to destination, and velocity toward the destination.

RMC Time, latitude, longitude, speed, heading, and date.

VTG Track (magnetic and true) and groundspeed (knots and KPH).

NMEA OUTPUT DATA FORMAT - VERSION 1.5

APA   Autopilot Format A

```
   1 2 3    4 5 6 7 8    9 10
APA,A,A,X.XX,L,N,A,A,XXX.,M,CCC
```

1   OR'ed Blink and SNR (A = valid, V = invalid)

2   Cycle Lock (A = valid, V = invalid)

3-5 Cross Track, Sense (L = steer left, R = steer Right), N.Mi. Units

6-7 Arrival Circle, Arrival Perpendicular (crossing of the line which is perpendicular to the course line and which passes through the destination waypoint.

8-9 Bearing dest. LMK. from origin LMK., Magnetic

10 Dest LMK. identifier

APB   Autopilot Sentence "B"

```
   1 2 3    4 5 6 7 8    9 10    11  12 13 14
APB,A,A,x.x,a,N,A,A,x.x,a,c—c,x.x,a,x.x,a*hh
```

1   Status: V = Loran-C Blink or SNR warning

       A = general warning flag for other

         navigation systems when a

         reliable fix is not available.

2   Status: V = Loran-C cycle lock warning flag

       A = OK or not used

3   Magnitude of XTE

4   Direction to steer (L, R)

5   XTE units, nautical miles

6   Status: A = arrival circle entered

7   Status: A = perpendicular passed at waypoint

8-9 Bearing origin to destination, M/T

10 Destination waypoint ID

11-12 Bearing, present position to destination, Magnetic or True

13-14 Heading to steer to destination waypoint, Magnetic or True

BWC   To Selected Waypoint, Great Circle

```
    1     2      3 4       5 6    7 8    9 10    11 12
BWC,XXXXXX,XXXX.XX,N,XXXXX.XX,W,XXX.,T,XXX.,M,XXX.X,N,CCCC
```

1   UTC of Bearing

2-3 Lat, N or S of waypoint

4-5 Long, E or W of waypoint

6-7 Bearing, True

8-9 Bearing, Magnetic

10-11 Distance, naut. miles

12 Waypoint identifier

GGA   Global Positioning System Fix Data

```
      1           2      3 4        5 6 7  8   9  1011
GGA, hhmmss.ss,111.11,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,

   1213  14
   M,x.x,xxxx*hh
```

1   UTC of Position

2-3 Latitude - N/S

4-5 Longitude - E/W

6   GPS Quality Indicator

  0 = fix not available or invalid

  1 = GPS Fix

  2 = Differential GPS Fix

7   Number of satellites in use

8   Horizontal dilution of precision

9   Antenna altitude above/below mean sea level

10 Units of antenna altitude

11 Geoidal separation - difference between the
    WGS-84 earth ellipsoid and mean sea level
    (geoid), "-" = mean sea level below ellipsoid

12 Units of geoidal separation, meters.

13 Age of Differential GPS data - Time in seconds
    since last SC104 Type 1 or 9 update, null field
    when DGPS is not used

14 Differential reference station ID, 0000-1023

GLL   Geographic Position — Latitude/Longitude

```
      1       2 3         4 5           6
GLL,1111.11,a,yyyyy.yy,a,hhmmss.ss,A*hh
```

1-2   Latitude, N/S

2-3   Longitude, E/W

4   UTC of position

6   Status A = Data valid

RMB   Generic Navigation Information (immediately follows RMC)

```
   1 2    3 4    5    6      7 8        9 10    11    12
RMB,A,X.XX,L,CCCC,CCCC,SSS.SS,N,XXXXX.XX,W,XXX.X,XXX.,XX.X,

   13 14
   A *XX
```

1   Status (A = valid, V = invalid)

2-3 XTE, naut. miles and direction to steer (L or
    R) [If XTE exceeds 9.99 NM, display 9.99 in
    field 2.]

4   Origin waypoint ID

5   Destination waypoint ID

6-7 Destination Waypoint Latitude (N or S)

8-9 Destination Waypoint Longitude (E or W)

10   Range naut. miles, present fix to destination
     waypoint Great Circle. [If range exceeds 999.9
     nm, display 999.9.]

11   Bearing, True, Great Circle, Present fix to
     dest. waypoint

12   Closing velocity to destination, knots

13   Arrival (OR'ed arrival circle and crossing of
     line which is perpendicular to the course line
     and which passes through the destination
     waypoint.)

14   CHECKSUM (Mandatory in this sentence.)

RMC   Transit Specific (to be followed by RMB)

```
   1        2 3        4 5        6 7   8    9          10 12
RMC,XXXXXX,A,XXXX.XX,N,XXXXX.XX,W,XX.X,XXX.,XXXXXX,XX.,E *XX
```

1   Time, UTC

2   Status (A = valid, V = invalid)

3-4 Latitude at UTC time, N or S

5-6 Longitude at UTC time, E or W

7   Speed, knots

8   HDG (track), degrees

9   Date (DDMMYY)

10   Variation, degrees

11   Variation, sense (E or W)

12   CHECKSUM (Mandatory in this sentence)

VTG   Actual Track and Ground Speed (SPD)

```
   1    2 3   4 5    6 7    8
VTG,XXX.,T,XXX.,M,XX.X,N,XX.X,K
```

1-2 Track degrees, True

3-4 Track degrees, Magnetic

5-6 Speed, knots

7-8 Speed, kilometers/hour

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BWC   Bearing and Distance to Waypoint

```
     1        2        3  4        5  6  7  8  9  10 11 12
BWC,hhmmss.ss1111.11,a,yyyyy.yy,a,x.x,T,x.x,M,x.x,N,c--c*hh
```

1   UTC of observation

2-3 Waypoint Latitude, N or S

4-5 Waypoint Longitude, E or W

6-7 Bearing, degrees True

8-9 Bearing, degrees Magnetic

10-11 Distance, naut. miles

12   Waypoint identifier

GGA   Global Positioning System Fix Data

```
        1       2   3  4        5 6 7  8   9  10 11
GGA, hhmmss.ss,1111.11,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,

  12 13  14
  M,x.x,xxxx*hh
```

1   UTC of Position

2-3 Latitude - N/S

4-5 Longitude - E/W

6   GPS Quality Indicator

0 = fix not available or invalid

1 = GPS SPS Mode, Fix valid

2 = Differential GPS, SPS Mode, fix valid

3 = GPS PPS Mode, fix valid

7   Number of satellites in use (00-12, may be different from the number in view)

8   Horizontal dilution of precision

9   Antenna altitude above/below mean sea level

10   Units of antenna altitude, meters

11   Geoidal separation - difference between the WGS-84 earth ellipsoid and mean sea level (geoid), "-" = mean sea level below ellipsoid

12   Units of geoidal separation, meters.

13   Age of Differential GPS data - Time in seconds since last SC104 Type 1 or 9 update, null field when DGPS is not used

14   Differential reference station ID, 0000-1023

GLL   Geographic Position — Latitude/Longitude

```
    1     2 3      4 5       6
GLL,1111.11,a,yyyyy.yy,a,hhmmss.ss,A*hh
```

1-2   Latitude, N/S

2-3   Longitude, E/W

4   UTC of position

6   Status A = Data valid

              V = Data not valid

RMB   Generic Navigation Information (immediately follows RMC)

```
1 2   3 4   5     6     7 8     9 10 11  12 13 14
```

RMB,A,X.XX,a,c--c,c--c,1111.11,a,yyyyy.yy,a,x.x,x.x,x.x,A *hh

1   Data Status (A = valid, V = invalid)

2-3 XTE, naut. miles and direction to steer (L or R) [If XTE exceeds 9.99 NM, display 9.99 in field 2.]

4   Origin waypoint ID

5   Destination waypoint ID

6-7 Destination Waypoint Latitude (N or S)

8-9 Destination Waypoint Longitude (E or W)

10   Range naut. miles, present fix to destination waypoint Great Circle. [If range exceeds 999.9 nm, display 999.9.]

11   Bearing, True, Great Circle, Present fix to dest. waypoint

12   Closing velocity to destination, knots

13   Arrival (OR'ed arrival circle and crossing of line which is perpendicular to the course line and which passes through the destination waypoint.)

14   CHECKSUM (Mandatory in this sentence.)

RMC   Transit Specific (to be followed by RMB)

```
1    2   3    4 5     6 7 8   9          10
```

RMC,hhmmss.ss,A,1111.11,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a *hh

1   Time, UTC of position fix

2   Status (A = valid, V = Navigation receiver warning)

3-4 Latitude at UTC time, N or S

5-6 Longitude at UTC time, E or W

7   Speed over ground, knots

8   Course over ground, degrees

9   Date (DDMMYY)

10   Magnetic variation, degrees

11   Magnetic variation, sense (E or W)

12   CHECKSUM (Mandatory in this sentence)

VTG   Course over ground and Ground Speed (SPD)

```
    1 2 3 4 5 6 7 8
VTG,x.x,T,x.x,M,x.x,N,x.x,K*hh
```

    1-2 COG, degrees True

    3-4 COG, degrees Magnetic

    5-6 SOG, knots

    7-8 SOG, kilometers/hour

APA   Autopilot Format A

```
   1 2  3   4 5 6 7  8  9 10
APA,A,A,x.x,a,N,A,A,x.x,M,c--c*hh
```

    1   OR'ed Blink and SNR (A = valid, V = invalid)

    2   Cycle Lock (A = valid, V = invalid)

    3-5 Cross Track Error, Sense (L = steer left, R =
        steer Right), N.Mi. Units

    6-7 Arrival Circle, Arrival Perpendicular (crossing
        of the line which is perpendicular to the course
        line and which passes through the destination
        waypoint.

    8-9 Bearing dest. LMK. from origin LMK., Magnetic

    10 Dest LMK. identifier

The formats listed are NMEA formats and Magellan receivers may not output all of the information listed for a particular format.

A complete copy of the NMEA specifications can be obtained from:

NMEA
PO Box 3435
New Bern, NC 28564-3435

Abbreviations

2D	Two-dimensional
3D	Three-dimensional
AUX	Auxiliary functions
BRG	Bearing
CDI	Course Deviation Indicator
CLR	CLEAR
COG	Course over ground
CTR	Center key
CTS	Course to steer
DEG	Degrees
DTG	Distance to go
ENT	ENTER
EPE	Estimated position error
ESC	Escape key
ETA	Estimated time of arrival
FM	Fathoms
Ft	Feet
GPS	Global Positioning System
HDOP	Geometric quality
INIT POS	Initialize position
Km	Kilometers
Kph	Kilometers per hour
K/H	Kilometers per hour
Kts	Knots
KT	Knots
LAT	Latitude
LON	Longitude
M/H	Miles per hour
Mi	Miles
MIN	Minute
mm	Minutes (decimal format to two degrees of resolution)
mmm	Minutes (decimal format to three degrees of resolution)
Mph	Miles per hour
M	Meters
NAV	Navigate

Nm	Nautical mile
Nxt Scrn	Next screen
OSGB	Coordinate system used in Great Britain
POS	Receiver-generated name for current position
PWR	Power Key
SA	Selective Availability
SEC	Seconds
SET REF	Set reference
SOG	Speed over ground
SPD	Speed
TDs	Loran-based coordinate system
TRN	Direction to turn
TTG	Time To Go
Txt Crt	Text Create
UTM	Universal Transverse Mercator
UT	Universal Time (Greenwich Mean Time)
VMG	Velocity made good
WPT	Receiver-generated waypoint name
XTE	Cross track error

Specifications

Size	6" x 8" x 2.5", not including antenna (15.2 cm x 20.3 cm x 6.4 cm)
LCD display dimensions	6" diagonal

Temperature:

Operating	32°F to 122°F (0°C to 50°C)
Storage	-40°F to 167°F (-40°C to 75°C)
Case	splashproof
Antenna	Active low-profile patch

Operating Characteristics

Accuracy:

Position	12 meters RMS in 3D operation without SA
Velocity	0.5 meters/second RMS
Speed limit	up to 951 MPH (1,530 kilometers per hour)

Time to First Fix:

Cold start*   less than 1 minute

Warm start* 30 seconds

* Warm start: the receiver has obtained a position fix within the last 2 hours. Cold start: the receiver has been idle for 2 hours or longer.

Storage capacity up to 500 waypoints, up to twenty-five 50-leg routes

Update rate   once every second

Input voltage	10 - 35 VDC
Power consumption	6 watts for NAV 6500 12 watts for NAV 6510

Data Input/Output

Differential Input Baud Rate: 4800, 9600, 19200

NMEA Input/Output Baud Rate: 300, 1200, 2400, 4800, 9600

Coordinate Systems

Positions are locations that are described in a unique way so that one locations cannot be confused with another. This is done by using a coordinate system to describe locations. Your Magellan receiver has the ability to use any one of four different coordinates systems; LAT/LON (latitude and longitude), UTM (Universal Transverse Mercator), OSGB, and TDs. The one you select (in SETUP) will be determined by the maps and charts you use; you would generally want the receiver to display position coordinates in the same system that is used by your maps.

LAT/LON Coordinate System. LAT/LON is the most commonly used coordinate system today. It projects lines of latitude (parallels) and lines of longitude (meridians) onto the earth's surface. Lines of latitude are the equator and the horizontal lines that are parallel to it. Lines of longitude are the vertical lines that are perpendicular to the equator and pass through the poles. A position is described as being the intersection of a line of latitude and a line of longitude.
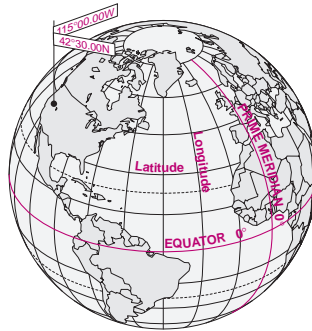
Specifically, a position is up to 90 degrees north or south of the equator (up to the poles, which are 90˚N and 90˚S; the equator is 0˚ latitude), and up to 180 degrees east or west of the Prime Meridian, which is 0˚ longitude. (The Prime Meridian passes through Greenwich, England.) Parts of a degree are minutes; there are 60 minutes (written as 60') to a degree. Minutes can also be divided into smaller units. Fractions of a minute can be expressed as decimals or as seconds. (There are 60 seconds to one minute, written as 60"). So a Lat/Lon position coordinate can be expressed in two ways, which your Magellan GPS receiver displays as 25°47.50 or 25°47'30.

UTM Coordinate System. Another commonly used coordinate system is UTM (Universal Transverse Mercator), which is generally found on land-based maps and quad sheets that are produced by government map providers. On land, you may find that UTM coordinates are easier to use than Lat/Lon.

Instead of projecting an imaginary grid of intersecting lines onto the globe, UTM projects sections of the globe onto a flat surface. Each of these sections is called a "zone." There are 60 zones to cover the entire earth between 84˚N and 80˚S (polar areas are not described by UTM). Each zone is 6˚ wide as projected from the earth's center.

A UTM position is described by three elements; the zone it is in, the easting, and the northing. Eastings and northings measure how far into a zone a position is in meters. Eastings are an east/west measurement, and correspond roughly to longitude. Northings are a north/south measurement, and correspond to latitude.

This chart shows the position of Magellan described in both Lat/Lon and UTM coordinates.

LAT/LON		UTM
DEG/MIN	**DEG/MIN/SEC**	
34˚06.58N	34˚06'35"N	11 4 23 818 E
117˚49.56W	117˚49'34"W	37 74 624 N
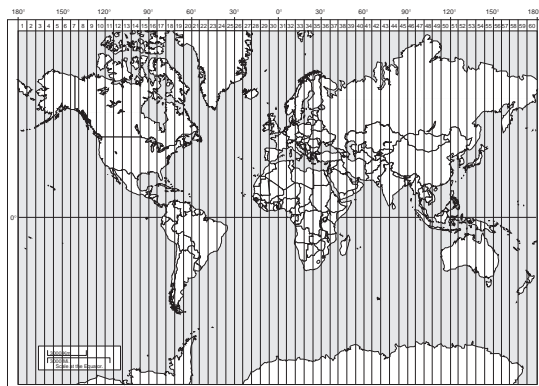
NOTE: The area described by the UTM coordinate system extends to 84˚N and to 80˚S.

Other Coordinate Systems. OSGB coordinates are similar to UTMs, but they describe only Great Britain. They must be used with the GBR36 datum, which also describes Great Britain. This coordinate system cannot be used in any other part of the world. The NAV 6500/6510 automatically selects the GBR36 datum when the OSGB coordinate system is selected in Setup. (While OSGB coordinates must be used with the GBR36 datum, the GBR36 datum can be used with LAT/LON coordinates; just be sure the map you are using uses both LAT/LON and GBR36.)

If you select OSGB in the COORD SYS portion of the Setup Menu be sure to change the map datum back to the one you will be using (WGS84 is the default) when changing to another coordinate system.

What Is GPS?

GPS is a constellation of navigation satellites that orbit the earth. The precise time and position information transmitted by these satellites is used by a GPS receiver to triangulate a position fix.

The system is now officially declared "initial operational," and provides continuous, 24-hour 3D (position plus elevation) coverage anywhere on the earth.

GPS was developed by the United States Department of Defense to provide consistent, reliable navigation information that is unaffected by rough terrain and bad weather, and is highly resistant to multipath errors and interference. The DoD continues to administer and control the Global Positioning System.

Although GPS was developed as a military navigation system, its civilian and commercial uses were recognized. The satellites therefore transmit two codes, a military-only encrypted code (PPS) and a civilian-access, Standard Positioning Service (SPS) code. All commercial and consumer GPS receivers are SPS receivers.

How Does GPS Work?

Each GPS satellite transmits its precise location (position and elevation) and the start time of the transmission. A GPS receiver acquires the signal, then measures the interval between transmission and receipt of the signal to determine the dis-

tance between the receiver and the satellite: this is ranging. Once the receiver has computed range for at least three satellites, its location on the surface of the earth can be determined.

Each satellite transmits two types of data, almanac and ephemeris. Almanac data is general information on the location and health of each satellite in the constellation. Since it contains general information, an almanac can be collected from any satellite. A receiver with a current almanac in its memory knows where in the sky to look for satellites, given its last known position and the time of day. Ephemeris data is the precise satellite positioning information that is used for ranging. Each satellite transmits its own ephemeris data.

Both almanac and ephemeris data are required for a GPS receiver to locate and acquire satellites quickly and compute a position fix.

Accuracy

GPS positioning with an SPS receiver that is intended for general use will produce accuracies of 25 meters or better.

In fact, SPS receivers have proven to be far more accurate than anyone anticipated. DoD has decided that 25-meter ac-

curacy is a potential risk, and has introduced Selective Availability (SA) to maintain a military advantage. SA is a random error that is introduced to the SPS code ephemeris data and reduces the accuracy of any SPS receiver. The size of the error changes, but rarely exceeds 100 meters.
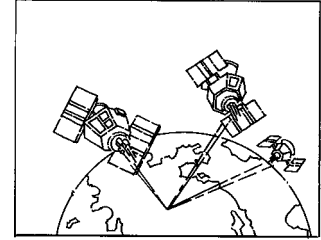
The DoD civil GPS user policy is that GPS accuracy as affected by SA is sufficient for general navigation. In an open environment, it usually is. Even with SA, a GPS receiver will bring you within visual range of a destination or target, and GPS remains the best available source of accurate, repeatable navigation and positioning information.

If you feel that you really need 25-meter accuracy, the effects of SA can be overcome with a technique called broadcast differential to produce highly accurate position fixes.

DGPS

Differential GPS (DGPS) computes the size of the error and applies it to positioning information. There are several ways to perform DGPS, one of which is broadcast differential. Broadcast differential uses GPS receivers at control sites to measure the range errors for all visible satellites and determines a correction for each satellite. These corrections are broadcast in the RTCM SC-104 format by a radio beacon at the control site to any differential beacon receiver that is within range of the signal.

The differential beacon receiver receives and demodulates the signal, then relays it to the user's differential-ready GPS re-

ceiver. The user's GPS receiver applies the corrections to the positioning information it collects to compute differentially corrected position and navigation data.

This technique requires that your GPS receiver be connected to a compatible differential beacon receiver (such as the Magellan DBR™, which is compatible will all differential-ready Magellan receivers). You must also be within range of a differential radio beacon.

More Information

For information relating to the operation of your Magellan GPS receiver, call Magellan at (909) 394-5000 and ask for Customer Service.

General information on the Global Positioning System and satellite status is available from the Civil GPS Information Center (GPSIC) in Virginia. It is operated by the United States Coast Guard for the Department of Transportation, and was established to provide information and to serve as a point of contact. There are three ways to telephone the GPSIC:

1.   24-hour recorded message at 703-313-5907

2.   Web site at www.navcn.uscg.mil

3.   24-hour live operator at 703-313-5900

Navtech provides seminars (for a fee) and books on GPS and navigation. The Navtech bookstore can be reached at 800-NAV-0885 or 703-931-0500, or FAX 703-931-0503.

Explanation of Data Terms

BRG. Bearing is the direction of a point (waypoint or cursor position) in relation to the boat or another point., as measured in degrees from north in a clockwise direction. The receiver uses either true north or magnetic north, as selected in the Setup Menu. The illustration shows a simple compass rose with the eight cardinal directions noted with their bearing.
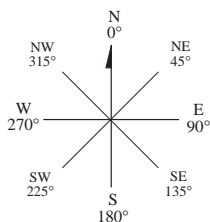
COG. Course over Ground is the direction of movement expressed as bearing. If a boat is pointing exactly north (0°) and there are no other factors affecting its travel, the COG would be 0° but that is rarely the case. Water currents and wind can affect the course the boat is taking. If there is a current passing from left to right across the boat (90°) the COG would change even though the bow of the boat is still pointing north. COG is measured in degrees with North being 0°.

CTS. Course to Steer. The optimum direction the boat should be steered in order to efficiently make headway back to the courseline while also proceeding toward the destination waypoint. It is a "compromise" course bearing that projects from your current position to a point (B1) on the courseline mid-way between a point (B2) perpendicular to your position and the current destination waypoint (B).
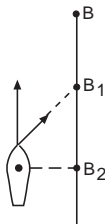
DRIFT. Speed of the current. The receiver requires external NMEA or manual input of the log speed and compass heading in order to calculate drift.

DST. Distance to go to an active waypoint, or the distance between two waypoints in a route leg.

SET. Direction of the current. The receiver requires external NMEA or manual input of the log speed and compass heading in order to calculate set.

SOA. Understanding speed of advance is a little tricky but once you do it becomes fairly simple. For this example we will use an exaggerated sample so as to clearly describe SOA.

The boat is heading towards the destination waypoint and is currently at point A. If the boat had followed the original course (A_1 – destination), it would be somewhere on the line A_1 — B_1. (The XTE for this sample is the distance between points A and A_1.) In 1 hour the boat is at point B and has travelled 34 NM (equivalent to a speed of 34 knots).

Now if you project downwards to the course the boat should be on, you arrive at point B_1.

Comparing the lines from points A and B and from points A_1 and B_1 you see that while the person travelled 34 NM he moved only 30 NM along the courseline. If he moves 30
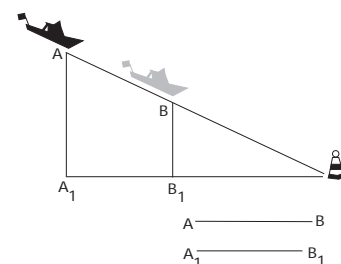
NM on the courseline in 1 hour, his SOA is 30 knots, whereas SOG would be 34 knots.

SOG. (Speed Over Ground) This is the speed at which the vehicle/vessel is moving in respect to the earth. SOG is measured in knots, miles per hour, or kilometers per hour. (This is not the same as speed through water, if you are travelling by boat.)

STR. Steering. The difference between COG and CTS. If COG is 25° and CTS is 30°, then STR is 5° Right.

TTG. Estimated time en route to reach the active waypoint.

TRN. Turning is the difference between COG and BRG. If COG is 80° and BRG is 75°, TRN is 5° left.

VMG. Velocity made good is the component of the velocity that is in the direction of the destination. In the above example, the boat is travelling directly towards the destination even though not on the courseline originally set. In this case, all of this velocity is being applied towards arriving at the destination, (i.e., VMG = SOG). Should
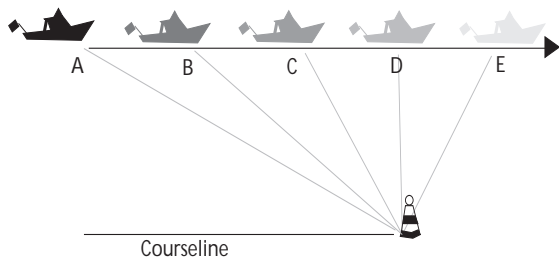
the boat veer away from this course and travel in a line parallel to the original courseline $(A_1;B_1)$ it would be travelling on a course that would not intercept the destination waypoint. As the boat moved along, less and less of its velocity would be applied toward arriving at the destination. By the time point D is reached, none of the velocity is applied to getting closer to the destination and the VMG would be 0. As it moves to point E, it is moving away from the destination and its VMG is a negative value.

XTE. XTE (cross track error) is the perpendicular distance from your boat to the left or right of the courseline that you are traveling. As you will see in the discussion of other data items, XTE is important in computing them accurately. Keeping XTE at a minimum will help maintain the most direct route to your destination. This illustration shows a boat courseline. The arrows between the boat and the courseline is the distance of XTE and this boat is to the left of the courseline. This boater would need to steer right to close the XTE.

Courseline

Glossary

Active Leg   The segment of a route currently being traveled.

Azimuth   The angular measurement from the horizon to a satellite or other object.

Bearing   The compass direction from your position to a destination, measured to the nearest degree.

Coordinates   A unique numeric or alphanumeric description of position.

Course   The direction in degrees from the start waypoint of a course line to its destination.

CTS   The optimum direction the vessel should be steered in order to efficiently make headway back to the courseline while also proceeding toward the destination waypoint. It is a "compromise" course bearing that projects from your current position to a point on the courseline mid-way between a point perpendicular to your position and the current leg destination waypoint.

Datum   Refers to the theoretical mathematical model of the earth's sea level surface. Map makers may use a different model to chart their maps from so positions will differ from one datum to another. The datum for the map you are using can be found in the legend of the map.

Estimated Position Error (EPE)   Estimated Position Error is the approximate error (between 0 and *X*) introduced in the ephemeris by the U.S. Department of Defense for reasons of security. This random error, known as Selective Availability (SA) is **not** due to receiver error and is not significant enough to affect navigation for most purposes (See DGPS in appendix).

Geometric Quality (HDOP)   Measures the probable accuracy of a position fix, based on the position of the satellites relative to each other.

GOTO   A single leg route with the present position being the start of the route and a defined waypoint as the destination.

Heading　　The direction in which the receiver is moving, track or ground course, (due to wind, current, and so forth), and may also be different from the course.

Latitude　　The angular distance north or south of the equator measured by lines encircling the earth parallel to the equator in degrees from 0° to 90°.

LAT/LON　　Coordinate system using latitude and longitude coordinates to define a position on the earth.

Leg (Route)　　A segment of a route that has a starting (FROM) waypoint and a destination (TO) waypoint. A route may consist of 1 or more legs. For a route that is from waypoint A to waypoint B, waypoint B to waypoint C, and waypoint point C to waypoint D has three legs with the first leg being from waypoint A to waypoint B.

Longitude　　The angular distance east or west of the prime meridian (Greenwich meridian) as measured by lines perpendicular to the parallels and converging at the poles from 0° to 180°.

Magnetic North　　The direction toward the north magnetic pole from the observer's position.

OSGB　　A coordinate system describing only Great Britain, similar to UTMs. Generally used with GBR36 datum, which also describes only Great Britain. This coordinate system cannot be used in any other part of the world. The receiver automatically selects the GBR36 datum when the OSGB coordinate system is selected in Setup. (While OSGB coordinates must be used with the GBR36 datum, the GBR36 datum can be used with LAT/LON coordinates; just be sure the map you are using uses both LAT/LON and GBR36.)

Position Fix　　Position coordinates as computed by the receiver.

Reverse Route Duplicates an existing route but in reverse order.

Route A planned course of travel that is defined by a sequence of waypoints. When active, the route is used in the calculation of all navigation data except position, speed over ground and track/course over ground.

Start and Destination Waypoint (FROM/TO) Waypoints that mark the beginning and ending of a leg of a route.

TDs Coordinate system using lines of position determined by the Loran-C signals. Many coastal navigators use TDs because Loran is a familiar radio aid navigation and TDs are clearly marked on their charts. Your Magellan receiver can display position coordinates in TDs by converting from LAT/ LON.

Time To Go The estimated time for the receiver to reach the destination from its current position based on the current VMG.

True North The direction to the geographical North Pole from an observer's position. The north direction on any geographical meridian.

Track The actual path traveled, which may differ from the planned course.

Track History The track over a selected length of time.

UT Universal Time, formerly referred to as Greenwich Mean Time (GMT).

UTM Universal Transverse Mercator (UTM) metric grid system used on most large and intermediate scale land topographic charts and maps.

VMG Velocity Made Good. The component of the velocity that is in the direction of the destination.

Waypoint A location saved in the unit's memory which is obtained by entering data, editing data, calculating data or saving a current position. Used to create routes

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